

**Revised Environmental Assessment
Assessment of Effect
April 2002**



Project Title

Greenway Trail Segments in Undisturbed Areas

Grand Canyon National Park • Arizona

Grand Canyon National Park
South Rim

**Greenway Trail Segments in
Undisturbed Areas, Grand
Canyon National Park,
Coconino County, Arizona**

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Assessment of Effect

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Note to Reviewers and Respondents

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the record a respondent's identity, as allowable by law. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.** We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please Address Comments to:

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Introduction

This environmental assessment and assessment of effect provides disclosure of the planning and decision-making process and potential environmental consequences of building 2.3 miles of greenway trails in Grand Canyon National Park. This document also contains the information needed in consultation with the State Historic Preservation Office under Section 106 of the National Historic Preservation Act. The analysis of environmental consequences was prepared on the basis of a need to adequately analyze and understand the consequences of the impacts related to the proposed park developments and to involve the public and other agencies in the decision-making process. In implementing this proposal, the National Park Service (NPS) would comply with all applicable laws and executive orders.

Purpose And Need

The purpose of the proposed project is to provide a greenway pedestrian/bicycle/equestrian trail from the future Grand Canyon Transit Center in Tusayan (located near the park boundary) to Canyon View Information Plaza (the new orientation/transportation hub) within Grand Canyon National Park (South Rim). This trail would provide an alternative means for non-motorized access into the park. It would also provide a separated experience from the existing road and vehicles entering the park.

Management objectives as described in the General Management Plan (GMP) completed in 1995 that pertain to this project include providing a safe, efficient, and environmentally sensitive transportation system for visitors, employees, and residents, as well as preserving cultural and natural resources. Emphasis in these objectives is on non-motorized modes of transportation wherever feasible. Currently the visitor experience has been one of congestion on the road system and often on the shuttle system, as well. Biking and walking has been dangerous in many areas because not enough lanes, paths, or trails have been designated and constructed to accommodate the use. Also, the visitor experience coming to the rim is on a major highway, Arizona State Highway 64. In the future, a mass transit system will bring visitors from Tusayan to Canyon View Information Plaza. A separate pedestrian/bicycle/equestrian trail is needed to allow visitors to approach the rim on a more human scale, under their own energy, and at their own pace. This type of approach to the rim through a natural setting and not mixed with motorized transportation would provide a more diverse range of choices on how visitors could first experience the canyon and how they will continue to explore various rim locations.

Employees and residents living in Tusayan but working or recreating at the South Rim do not have a safe and separate pedestrian/bicycle access to the South Rim area other than using the main entrance road. No trails through the adjacent National Forest or the park lead directly from Tusayan to the Canyon View Information Plaza area. Residents of Grand Canyon Village have also expressed a need for safe pedestrian/bicycle access to Tusayan and the nearby National Forest. Also there is no trail connection for users of the Arizona Trail to enter the park and cross the canyon on the South Rim.

Management And Planning History

The GMP for the park includes a system of greenway trails. These multi-use trails that would make up the Grand Canyon Greenway (Greenway), total 73 miles in length and would be created on both the North Rim and the South Rim of Grand Canyon National Park. On the South Rim, the Greenway is an important component of the park's plan to reduce vehicle use in the park.

The Greenway project would be built through the efforts of Grand Canyon National Park, Grand Canyon National Park Foundation (a private, non-profit fundraising organization), and The Greenway Collaborative (a group of greenway planners and designers specially formed to make this project happen).

On the South Rim, 45 miles of greenway are proposed in the following areas:

- Canyon View Information Plaza to Grand Canyon Transit Center - 7 miles
- Canyon View Information Plaza to Grand Canyon Village - 2 miles
- Grand Canyon Village to Hermits Rest - 8 miles
- Yavapai Point to westernmost overlook on Desert View Drive - 2 miles
- Westernmost overlook on Desert View Drive to Desert View - 26 miles

Two segments of greenway trail – involving approximately 2.3 miles – remain to be built in previously undisturbed areas in order to complete the trail from the future Grand Canyon Transit Center in Tusayan to the Canyon View Information Plaza in Grand Canyon National Park, which is in accordance with the 1995 GMP. This Environmental Assessment (EA) analyses the impacts associated with those segments.

Project Location

Grand Canyon National Park – designated a World Heritage site – is one of the most popular tourist destinations in America. It is located in the southwestern United States on the Colorado Plateau in Coconino County, Arizona (Figure 1). The park is divided by the canyon into the North Rim and South Rim areas. This analysis is focused on the South Rim.

The two segments of the trail being analyzed are located in the following areas, depicted in Figure 2:

- A 1.6 mile trail segment that begins south of Canyon View Information Plaza off the utility corridor and travels south about ½ mile west of Highway 64 and then crosses Highway 64 just south of the highway's junction with Desert View Drive. The trail segment then parallels the east side of Highway 64 and continues south to a point where it connects with an existing two-track trail. This segment of the trail can be found on the Phantom Ranch, Arizona USGS 7.5 minute topographic quad map. The legal description is:

Township 31N

Range 2E

Section 25

Range 3E

Sections 19 and 30 (projected)

- A 0.7-mile trail segment that starts across Highway 64 from Moqui Lodge (near the park boundary) and continues northeast up a ravine and then connects with an existing two-track trail. This segment of the trail can be found on the Tusayan East, Arizona USGS 7.5minute topographic quad map. The legal description is:

Township 30N

Range 2E

Section 12

Range 3E

Section 7



Figure 1. Vicinity map

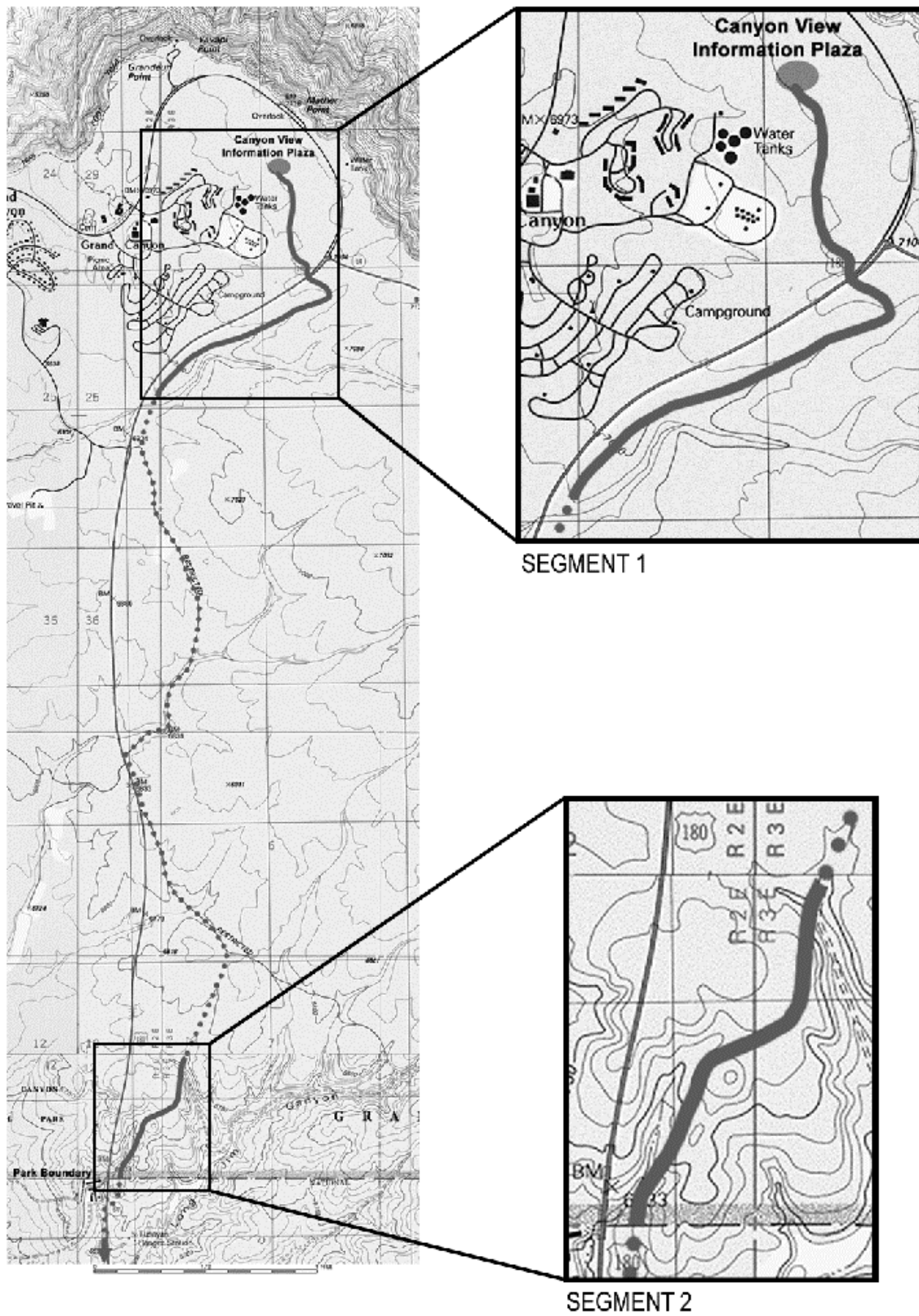


Figure 2. Project Area

Issues And Impact Topics Included in this Document

This environmental analysis was prepared in accordance with the regulations of the Council on Environmental Quality (CEQ), the National Environmental Policy Act (40 CFR § 1500 *et seq.*) and in part 516 of the U.S. Department of the Interior's Departmental Manual (516 DM).

Internal scoping was conducted in November 2000 with NPS personnel of disciplines that could potentially be affected by the proposed project. From this effort, preliminary issues were defined for public scoping. A public scoping letter about this project was then sent to 153 individuals in March 2001, including federal and state agencies, special interest groups, American Indian tribes, and interested citizens. The letter described the proposed project, delineated the proposed trail alignments on a topographic map, summarized the preliminary issues, and requested comments. Ten letters were received from interested agencies, groups and citizens. In addition to the scoping letter, a news release was sent to local newspapers regarding the project and it was briefly discussed at the April Community Meeting held at the Shrine of Ages in the park.

Issues and impact topics analyzed in this document are: geology/soils, biotic communities (vegetation, wildlife, and threatened and endangered species), air quality, cultural resources (archaeological, historical, and traditional cultural properties), and recreation. A summary of the impact topics and rationale for selection are given below.

Natural Resources

Geology/Soils

Proposed activities have potential to impact the soil resource; therefore, this topic will be addressed in this document.

Biotic Communities

Vegetation

Proposed trail development would involve disturbance of vegetation in two distinct areas. Potential for introduction and/or spread of exotic vegetation and noxious weeds exists from ground disturbing activities and equestrian use. Vegetation could be impacted by tying horses to existing vegetation. Therefore, this topic will be analyzed in this document.

Wildlife

Proposed trail development could potentially disturb wildlife and could potentially fragment wildlife habitat or disrupt developed wildlife corridors. Therefore, this topic will be analyzed in this document.

Threatened and Endangered Species/Special Status Species

Section 7 of the Endangered Species Act of 1973, as amended, requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. Therefore, special status species will be addressed as an impact topic in this document.

Air Quality

Section 118 of the Clean Air Act, as amended (42 USC 7401 *et seq.*) requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. Grand Canyon National Park is designated a Class I area under the Act. In Class I areas, maximum allowable increases of sulfur dioxide, fine particulate matter, and nitrogen oxide above baseline concentrations are strictly limited. Congress has set a further goal of natural visibility conditions, free of human-caused haze, in these areas. Project activities have the potential to affect air quality. Therefore, air quality is analyzed in this document.

Cultural Resources

The NPS is mandated to preserve and protect its cultural resources through the Organic Act of August 25, 1916, and through specific legislation such as the Antiquities Act of 1906, NEPA of 1969 (as amended), National Historic Preservation Act of 1966 (as amended), NPS Management Policies, Cultural Resource Management Guideline (Director's Order-28), and the Advisory Council on Historic Preservation's implementing regulations regarding "Protection of Historic Properties" (36 CFR §800). Other relevant policy directives and legislation are detailed in Director's Order-28.

Archaeological Resources

Project activities have the potential to affect archaeological resources. Archaeological resources, therefore, they are analyzed in this document.

Historical Resources

Project activities have the potential to affect historical resources, and are analyzed in this document.

Ethnographic Properties

Project activities have the potential to affect ethnographic properties; therefore, they are analyzed in this document.

Visitor Experience

Recreation

Construction of the proposed trail has the potential to change the recreational experience and would be perceived by users as a different way to experience the park. Construction of the proposed trails would be far enough removed from Highway 64 that it would not affect vehicular traffic in the park. However, portions of existing roads that will become part of the trail system will be closed off to recreational use during construction. Also, there are potential safety issues regarding mixing hikers, bicyclists, and horses. This topic is, therefore, analyzed in this document.

Impact Topics Eliminated from Further Consideration

Water Quality

The NPS seeks to restore, maintain, and enhance the quality of all surface and ground waters within the park, consistent with the 1972 Federal Water Pollution Control Act, as amended, and other applicable federal, state, and local laws and regulations. The only potential impact to water quality from the proposed project would be from erosion caused by precipitation runoff on the trail. As proposed, the trail would be treated to have a hardened, and therefore erosion-resistant, surface. In areas with a high potential for runoff erosion, the surface of the trail would be covered with asphalt for short segments to prevent erosion. All National Pollutant Discharge Elimination System (NPDES) requirements would be met. As no impacts to water quality from the proposed project are anticipated, water quality was eliminated from further consideration as an impact topic in this document.

Environmental Justice

In general, the term “environmental justice” refers to fair treatment of all races, cultures, and income levels with respect to laws, policies, and government actions. In February 1994, Executive Order 12898, titled Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, was released to federal agencies. This order requires each federal agency to incorporate environmental justice as part of its mission. Federal agencies are specifically ordered to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations. In a related memorandum to heads of all federal departments and agencies, released concurrently with Executive Order 12998, the President underscores provisions of existing laws that are intended to help ensure the environmental quality of communities throughout the nation. This memorandum further states that mitigation measures identified in environmental documents should address significant and adverse environmental effects on minority communities and low-income communities.

Neither alternative would have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency’s Draft Environmental Justice Guidance (July 1996), as well as Executive Order 12898. This topic was eliminated from further consideration as an impact topic in this document.

Floodplains

Executive Orders 11988 (“Floodplain Management”) require an examination of impacts to floodplains. The 2001 NPS Management Guidelines, DO-12, NPS-12, and the 1995 GMP provide guidelines on developments proposed in floodplains. Executive Order 11988 requires all federal agencies to avoid construction within the 100-year floodplain unless no other practical alternative exists. Certain construction within a 100-year floodplain requires that a Statement of Findings be prepared and accompany a Finding of No Significant Impact. The Flood Insurance Rate Map of Coconino County, Panel 1850 OF 4525, Effective date November 16, 1983 produced by the Federal Emergency

Management Agency indicates that no portions of the proposed trail are within the 100-year floodplain. Therefore, no Statement of Findings for floodplains will be prepared and this issue was eliminated as an impact topic in this document.

Wetlands

Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, where possible, impacts on wetlands. Proposed actions that have the potential to adversely impact wetlands must be addressed in a Statement of Findings. Soils, hydrology, and vegetation typical of a wetland environment classify jurisdictional wetlands. No jurisdictional wetlands exist at or near the project area. Therefore, this topic was eliminated as an impact topic in this document.

Prime and Unique Farmland

Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to the Natural Resource Conservation Service, there are no prime or unique farmlands associated with the project area. Therefore, prime and unique farmlands was eliminated as an impact topic.

Socioeconomic Values

The local economy and most businesses of the communities surrounding the park are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. There may be short-term, negligible benefits to the local and regional economy resulting from construction-related expenditures and employment. Local and regional businesses would not be appreciably affected in the long-term. Therefore, this topic was eliminated as an impact topic.

Soundscape

The NPS is mandated by DO-47 (Sound Preservation and Noise Management) to articulate their operational policies that will require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of “the scenery and the natural and historic objects and the wildlife” protected by the Organic Act. Natural sounds may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern because they sometimes impede the ability of the NPS to accomplish their mission.

Noise impacts from this project would only last during construction. After construction is completed, noise level impacts would be negligible from the occasional hiker or bicyclist using the trail and would essentially return to their natural condition. All construction would occur during daylight hours, when roads and the associated traffic already impact the proposed trail area. Therefore, this topic will not be analyzed in this document.

Park Operations

The proposed trails would be integrated into the park’s trail system and incorporated into routine patrol conducted by park rangers. Maintenance of the trail would be paid for

through an endowment established by the Grand Canyon National Park Foundation, such as the endowment that has been created for Phase I and Phase II of the Greenway Trails system. Park operations, therefore, will be not be affected by the alternatives, and will not be analyzed in this document.

Introduction

This section describes two management alternatives for this project. In developing alternatives for this project, some actions were considered and subsequently dismissed. At the end of the alternatives section is a description of alternatives considered and eliminated and the reasons for their elimination.

Alternative A – No Action

This alternative would keep the existing situation as it is today. Visitors, residents, and employees wanting to walk or bicycle to and from the park and Tusayan would use the existing Highway 64 shoulders. The more adventurous visitors could use some of the existing access paths through the National Forest and the park to keep away from Highway 64 and its traffic, but they would have to cut back to Highway 64 roughly one mile south of Canyon View Information Plaza and travel this last leg on the highway.

Alternative B – Proposed Action

This alternative proposes to construct approximately 2.3 miles of trail in previously undisturbed areas in Grand Canyon National Park to complete a seven-mile trail from Canyon View Information Plaza to the Grand Canyon Transit Center just north of Tusayan. The proposed trail would be ten-feet-wide with a hardened surface and a stabilized shoulder made from a mix of aggregate and topsoil. An area 12 to 14-feet-wide would be temporarily disturbed during construction. If staging areas are needed for construction, they would be located in areas that are already disturbed (e.g. existing trail corridors or utility clearings). Areas along the trail that may experience heavy runoff may be paved to prevent erosion. Design and construction would promote sustainability where possible and would strive to minimize impacts on the land.

The trail would provide a possible extension of the Arizona Trail into the park for hikers, cyclists, and equestrian users – motorized vehicles would not be allowed except for maintenance activities. Areas along the trail with dense vegetation may be cleared below the shoulder height to allow safe maneuverability for cyclists. The trail would become part of the overall trail system in the park and would be included in routine patrols by park rangers. Construction and design would be completed in accordance with the Americans with Disability Act (PL 101-336, 1990) and the Uniform Federal Accessibility Standards for recreational trails. Although motorized vehicles would not be allowed on the trail, emergency access using motorized vehicles would be permitted. American Association of State Highway and Transportation Officials (AASHTO) standards would be applied where appropriate. Safety and traffic control signs would be located along the trail as needed.

Figure 2 shows the locations of the two trail sections analyzed in this EA and the complete trail (from Tusayan to Canyon View Information Plaza), which would provide an alternative means of transportation (e.g., walking, bicycling, wheel chair use and horseback riding) separate from the highway and in a natural setting. The two portions of this trail that comprise the proposed action are located in the following areas, depicted in Figure 2:

- A 1.6 mile trail segment that begins south of Canyon View Information Plaza off the utility corridor and travels south about ½ mile west of Highway 64 and then crosses Highway 64 just south of the highway's junction with Desert View Drive. The trail segment then parallels the east side of Highway 64 and continues south to a point where it connects with an existing two-track trail.
- A 0.7-mile trail segment that starts across Highway 64 from Moqui Lodge (near the park boundary) and continues northeast up a ravine and then connects with an existing two-track trail.

Mitigation Measures on the Proposed Action

Mitigation measures are analyzed as part of the proposed plan in the action alternative. These measures have been developed to lessen the potential adverse effects of the proposed action.

Natural Resources

Geology/Soils

- To minimize soil erosion at the project site, standard erosion control measures including silt fence and sandbags will be incorporated into the proposed action. Any revegetation efforts will use site-adapted native species and/or seed.
- Construction zones will be fenced with construction tape, snow fencing, or some similar material before any construction activity begins. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

Biotic Communities

Vegetation

To prevent and minimize the spread of exotic vegetation and noxious weeds, the following mitigation measures would be implemented:

- Existing populations of exotic vegetation at the construction site will be treated prior to construction activities.
- All construction equipment that leaves the paved road will be pressure washed prior to entering the project site.
- The location of the staging area will be limited to existing roads or the disturbed area.

- Parking of vehicles will be limited to the staging area and existing roads.
- Any fill material will be obtained from a park-approved source.
- All areas disturbed by construction will be revegetated using site-adapted native seed and plants.
- Native plants will be salvaged from the project site and used to revegetate the site after construction activities have been completed. Plants will also be propagated according to NPS policy, from seed collected on adjoining areas to protect local genotypes.
- Post project exotic plant monitoring will be conducted in the project area as time and funding allows.

To prevent damage to the existing vegetation, hitching posts will be provided on the trail to tie horses at rest stops and at the ends of the trail.

Wildlife

- All construction equipment and materials that are brought on site will be inspected for exotic pests. Any exotic pests that are found will be removed prior to equipment or materials entering the park.
- Construction workers and supervisors will be advised to keep their work site clean of debris, especially food wrappers and waste that may attract wildlife. Workers and supervisors will also be instructed to not feed the wildlife.
- Signs will be posted at both ends of the trail that instructs users to “not feed the wildlife”. Signs will also advise users that no drinking or restroom facilities are found along the 7-mile trail.
- All trash cans placed along the trail will be “wildlife-proof.”

Threatened and Endangered / Special Status Species

- Construction workers and supervisors will be informed about special status species that are known to occur in the project area. If previously unknown special status species are discovered during construction, all work in the immediate vicinity of the discovery will be halted until Park staff re-evaluates the project and the work modified to allow for any protection measures determined necessary to protect the special status species.
- If a California condor occurs at the construction site, construction will cease until it leaves on its own or until techniques are employed by permitted Park staff or Peregrine Fund personnel that results in the individual condor(s) leaving the area.
- Construction workers will be informed to refrain from interacting with condors and to immediately contact the appropriate Park or Peregrine Fund personnel when condor(s) are seen at the construction site.

- The construction site will be cleaned up at the end of each work day (i.e. trash disposed of, scrap material picked up) to minimize the likelihood of condors visiting the construction site.
- To prevent water contamination and potential poisoning of California condors or other wildlife, a vehicle fuel leakage and spill plan will be developed and implemented. The plan will include immediate clean up of any hazardous substance. The plan will define how each hazardous substance will be treated in case of leakage or spill.
- If condors are detected roosting, perching, or feeding in an area accessible to visitors using this trail corridor, portions of the trail may be closed temporarily until the condor(s) leave(s) on its own, completes foraging activities, or techniques are employed by permitted Park staff or Peregrine Fund personnel that results in the condor(s) leaving the area.
- Those portions of the trail within 0.5 miles of the canyon rim will have construction activities restricted to the non-breeding for the Mexican Spotted Owls (September 1 to March 1).

Air Quality

To minimize air pollution, the following mitigation measures would be enacted:

- Heavy construction equipment will not idle for more than five minutes.
- Construction areas will be sprinkled with reclaimed water to reduce fugitive dust.
- A curfew will be imposed that limits construction activities in the summer (May 1 – September 30) to the hours between 8:00 am and 6:00 pm, and in the winter (October 1 – April 30) to the hours between 9:00 am and 5:00 pm.

Cultural Resources

To minimize impacts to cultural resources, the following mitigation measures will be implemented:

- If previously unknown archeological resources are discovered during construction, all work along trail sections will be halted until the resources are identified and documented by a qualified archaeologist from the NPS, and an appropriate mitigation strategy developed, if necessary, in accordance with the stipulations of the 1995 *Programmatic Agreement Among the National Park Service, the Arizona State Historic Preservation Office, and the Advisory Council on Historic Preservation Regarding the General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona*.
- All workers will be informed of the penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers will also be informed of the correct procedures if previously unknown resources are uncovered during construction activities.

- Should unknown buried deposits be located, data recovery excavations will be undertaken. These subsurface survey and data recovery efforts would be guided by a project-specific research design. Additionally, the NPS would begin consultations under the Native American Graves Protection and Repatriation Act in the event that buried human remains are discovered during archeological excavations or project development.
- All known archaeological sites that could be indirectly impacted by use of the trail alignment will be monitored annually by the NPS for indirect impacts associated with trail users venturing off the designated trail. Monitoring will consist of, at a minimum, photo documentation and written descriptions of the sites. In the event that impacts are observed, the Cultural Resource Manager for NPS will determine an appropriate mitigation strategy, which may include data recovery plan or preventive measures.

Alternatives Considered But Eliminated From Consideration

In developing the alternatives, other alignments were considered but eventually rejected. Brief descriptions of these alternatives and the reasons for their elimination are provided below.

Alternative 1 – Northern Portion (Segment 1)

The alignment for this 1.6-mile segment was originally designed to be built next to Highway 64. After completing cultural resource surveys, this alignment was shifted approximately ½ mile to the west to avoid the potential of directly impacting several archaeological sites.

Alternative 2 – Southern Portion (Segment 2)

The southern portion of the trail (approximately 0.7 miles in length) was to follow an existing two-track road to the southeast. However, in coordinating the trail alignment with the Tusayan Ranger District of the Kaibab National Forest, it was determined that the Forest Service did not want a public trail that would pass through or near their equipment/supply yard and employee housing.

Alternative 3 – Direct Route from Canyon View Information Plaza to Transit Center

An alignment was considered that was the shortest route from Canyon View Information Plaza to the Grand Canyon Transit Center. This alternative was rejected because a primary goal of the trail was to take advantage of existing disturbances and naturally clear areas to minimize the amount of vegetative habitat disturbed to construct the trail.

Alternative 4 – Paving Highway 64 Shoulders for Bike Lanes

An alternative was considered that would pave the shoulders of Highway 64. This alternative was rejected because it does not meet the purpose and need for separating this type of visitor experience from the motorized corridor. Additionally, it does not address the safety concerns of cyclists and hikers on Highway 64.

Environmentally Preferable Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the CEQ. The CEQ provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

- assure for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative B is the environmentally preferable alternative. Alternative B was designed to use existing trails and disturbed areas where possible, and to avoid major or adverse impacts to resources. Alternative B provides a high level of protection of natural and cultural resources and integrates resource protection while providing an appropriate range of visitor uses.

Summary Of Environmental Impacts

Table 1 is a matrix of environmental consequences to the impact topics identified in Chapter 1 as a result of implementing either the No Action or Proposed Action alternatives.

Table 1. Summary of Environmental Consequences		
Impact Topic	Alternative A No Action	Alternative B Proposed Action
Geology/Soils	No impacts to soils would be expected.	Soils covering roughly 3.35 acres would be disturbed from construction activities with roughly 2.23 acres being turned into the trail bed surfaced with hardening agents and possibly asphalt in short, erosion-prone segments. Short-term impacts would be minor. Long-term impacts, primarily erosion potential would be negligible. Cumulative impacts would also be negligible.
Biotic Communities Vegetation	Slight potential for spread of exotic plants or noxious weeds from using existing trails. Impacts would be negligible. Cumulative impacts would be minor with increase in disturbance around the park.	Roughly 3.35 acres of low-density vegetative habitat would be disrupted by construction activities. After construction of the trail, the shoulder areas would be revegetated according to NPS policy with plants and/or seed collected from adjacent areas to protect local genotypes. Introduction of non-native plant species would be minimized through the selection of appropriate borrow material used to cap any areas requiring fill dirt. Cleaning of equipment prior to entering the project area would reduce introduction of non-native seeds. Erosion-control mitigation measures would minimize any erosion-related impacts to neighboring vegetation. Enacting erosion control measures during construction would reduce potential for erosion of soil and surrounding vegetation, making the short-term impact to vegetation negligible. Long-term impacts to vegetation would be minor.
Wildlife	Use of the exiting trails is expected to continue at the present levels, which is very low; therefore, impacts to wildlife would be negligible.	Placement of the Greenway was designed to decrease habitat fragmentation and subsequent wildlife mortalities; therefore, the proposed action should have a negligible effect on vertebrate species in the project area. Wildlife may be temporarily displaced from the area during construction activities (short-term), but would be expected to return to the area after construction activities have been completed. Short-term impacts to wildlife would be minor. The use of mitigation measures would reduce possible impacts to wildlife; therefore, long-term impacts to wildlife would be negligible to populations but may be adverse to individuals.

Impact Topic	Alternative A No Action	Alternative B Proposed Action
Threatened & Endangered Species	No short or long term impacts to any special status species would be expected.	<p>The possibility that visitors or backcountry recreationists using this portion of the trail are affecting Mexican spotted owls in the park is considered very unlikely. However construction activities may affect but are not likely to adversely affect the Mexican Spotted Owl and its habitat.</p> <p>The closest active peregrine falcon territory is four miles from the project area. Although peregrine falcons have been observed flying over forested areas of the park, main foraging areas that have been documented are limited to the rim, about one-half mile into the forest area from the rim, and river areas at the bottom of the canyon where prey is abundant. The proposed project would have no effect on the peregrine falcon.</p> <p>Impacts to condors from the proposed action may occur in the form accidental displacement when startled individuals are flushed from perch or roost sites by visitors using the trail. The proposed project may affect, but is not likely to adversely affect the California condor.</p> <p>The Sentry milk vetch is known to occur several miles from the project area. No plants were discovered during biological surveys of the project area. The proposed project would have no effect on the Sentry milk vetch.</p> <p>The proposed action should have a no impact on the adjacent goshawk territories, and therefore, no impact on Northern goshawks.</p>
Air Quality	Continued use of the existing trails and two-tracks in the area for hiking and bicycle riding without a hardening agent on the surface would cause fugitive dust emissions. However, volume of traffic on the trails and tracks are expected to be light and have a negligible impact on air quality.	Short-term impacts to air quality from the proposed action would occur from construction activities. Implementation of mitigation measures would keep fugitive dust and exhaust emissions to a minimum. Following construction, little fugitive dust is anticipated because of surfacing the trail to prevent dust and erosion. Short-term impacts to air quality would be minor. Long-term impacts to air quality are expected to be minor.

Impact Topic	Alternative A No Action	Alternative B Proposed Action
Visitor Experience Recreation	<p>The management goal in the 1995 GMP of providing visitors with an alternative means of entering the park via bicycle or foot would not be met. The majority of visitors would continue driving into the park or would take a mass transit system once it is developed. There would not be a connection for the Arizona Trail. There would be moderate long-term impacts to recreation from implementing no action.</p>	<p>Portions of existing roads that would be used for the greenway trail system would be closed during construction. The present level of use of these roads is unknown, but thought to be very light. Recreationists that use these trails would not be allowed access to those portions of the trails under construction.</p> <p>Completion of a trail from Tusayan to the park would provide visitors and residents with an alternative means of entering the park. It would also provide a safer route than what many bikers and walkers currently use, some of which necessitates travel along Highway 64. Some current users might find the improvements and increased use of the trail undesirable. Short-term impacts would be minor. A connection with the Arizona Trail would be made. This action would result in a long-term moderate beneficial effect on recreational resources in the park</p>
Cultural Resources	<p>Archaeological sites may be indirectly impacted by use of the existing trails in the area, but would not be monitored under this action. No data would be collected and the sites would be left as they are. This action may have a long-term minor impact on archaeological resources in the area surrounding the existing trails.</p> <p>Erosion would be expected to continue on the existing historic entrance road during periods of heavy precipitation. No improvements or erosion control measures would be completed to the historic entrance road; therefore, impacts would be negligible.</p>	<p>Potential for indirect impacts exists for at least eight of the nine known archaeological sites adjacent to the trail. These sites are not in immediate danger of being impacted by the proposed project, but could be affected by users venturing off the trail. Construction of the trail segments is not expected to have any impact on archaeological resources. With implementation of the mitigation measures identified in Chapter 2, short-term and long-term impacts would be negligible.</p> <p>Erosion would be expected to continue on the existing historic entrance road during periods of heavy precipitation. No improvements or erosion control measures would be completed to the historic entrance road; therefore, impacts would be negligible.</p>

Introduction

This chapter briefly describes the existing environment of the project area. Detailed information on resources in Grand Canyon National Park can be found in the 1995 GMP/EIS (Final and Draft). This chapter is organized by the impact topics identified in Chapter 1.

Natural Resources

Geology/Soils

The proposed project area is in the southern portion of the Colorado Plateau. The soils tend to be shallow and poorly developed with frequent rock outcroppings. Underlying the soils is Kaibab limestone, a very porous and fossil-laden rock layer. Due to its porosity, this layer has numerous solution channels and sinks, creating subdued karst topography. Precipitation quickly penetrates the soil and rock layers, so little or no surface water is present except during heavy precipitation events.

Biotic Communities

Vegetation

The project area consists of mature ponderosa pine forest surrounded by juniper, piñon pine, and scrub oak habitat. The snag density is approximately two per acre. Big sagebrush occurs in drainages, and Utah juniper and bluegrass are also present.

Wildlife

The area proposed for development was surveyed for presence and/or absence of native vertebrate species. The area consists of mature ponderosa pine surrounded by juniper, piñon pine and scrub oak habitat. The snag density is approximately two per acre. Snags are used as habitat by several forest dwelling species of birds and bats. Many native species, including mule deer (*Odocoileus hemionus*), Abert squirrel (*Sciurus aberti*), several species of forest dwelling bats, bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*), use this area on a year round basis or as a movement corridor between summer and winter range (Grand Canyon National Park unpublished reports and observations). In addition, elk (*Cervus elaphus nelson*) are using this area in larger numbers than in the recent past, because of habitat restoration through the use of prescribed fire. The proposed project lies within the established "Natural Zone" (General Management Plan, Grand Canyon National Park, 1995).

Threatened and Endangered /Special Status Species

Table 2 shows the threatened, endangered, and special status species with the potential to occur within the project area. The table is followed by a brief discussion of each species. Five species of concern inhabit the general vicinity of the proposed action: the recently de-listed peregrine falcon (*Falco peregrinus*) "Special Status Species," the northern goshawk (*Accipiter gentilis*), California condor (*Gymnogyps californianus*), Mexican spotted owl (*Strix occidentalis lucida*), and the Sentry milk vetch (*Astragalus cremnophyllax* var. *cremnophylla*). Additional information regarding species of concern is provided in Appendix A, along with the letter from the U.S. Fish and Wildlife Service that lists the species of concern.

Table 2. Species of Concern for Proposed Greenway Segments near Tusayan and near Canyon View Information Plaza	
Species	Status
Mexican Spotted Owl	Threatened
Peregrine Falcon	Delisted
California Condor	Endangered
Sentry Milk-Vetch	Endangered
Northern Goshawk	State candidate species and Wildlife of Special Concern

Mexican Spotted Owl

The Mexican spotted owl was listed under the Endangered Species Act as Threatened in 1993 because of perceived threats by timber harvesting, habitat fragmentation, and catastrophic wildfires. Mexican spotted owls, located on forested plateaus and canyonlands throughout the Southwest United States and Mexico, have been thought to be dependent on late seral forests (Ganey and Balda 1989a; Willey 1996; Gutierrez et al. 1995). The Mexican spotted owl is generally restricted to isolated patches of habitat that include mixed conifer and pine-oak forests, riparian madrean woodland, and sandstone canyonlands (USDI 1995a.).

Mexican spotted owls have been reported in numerous visitor accounts for Grand Canyon National Park since the 1920s (unpublished park wildlife records, Natural Resources Office). Willey (1992) formally confirmed the presence of spotted owls within Grand Canyon National Park during field surveys conducted on the North and South Rims. These initial surveys encompassed approximately 6,000 acres of suitable habitat and utilized the formal US Forest Service protocol in existence at the time (USDA 1991). Willey's (1992) few responses were from within the canyon itself rather than the plateau areas. In 1994 and 1995, the most suitable South Rim plateau habitat was surveyed with negative results (Kuenzi unpub., Kaibab National Forest Wildlife files). In 1998 and 1999, a large-scale survey was undertaken on the North Rim. Additional surveys were conducted in 1999 by Willey (in prep.) in side canyon habitat with access achieved through the Colorado River corridor that elicited response from eight spotted owls. In 2001 a large-scale river based inventory was undertaken with the result of approximately 30 additional side-canyon dwelling owls located (Willey and Ward, in prep.) In 2001 surveys were also conducted along a 30-mile stretch of South Rim Plateau habitat resulting in multiple Mexican Spotted Owl detections (Willey and Ward, in prep.).

Taken together, the owl locations in the park suggest that the owl occupies the rugged canyonland terrain within the Grand Canyon rather than more classical late seral forest habitats on the North and South Rims. Given the large extent of potential canyonland habitat, a relatively large, and virtually unknown, spotted owl subpopulation may exist in Grand Canyon National Park. The status and management of these owls is therefore highly relevant to the species overall conservation and demographic health. This population may represent a potentially large source population for the Southwest as a whole (Shaffer 1985; Rinkevich *et al.* 1995).

Peregrine Falcon

The closest documented active peregrine falcon territory to the proposed project site is approximately four miles to the northeast (Brown 1990, Leslie 1995-1997). Although peregrine falcons have been observed flying over the forested areas of the park and occasionally foraging, main foraging areas are rim and river areas where prey is abundant.

While this species was removed from the List of Endangered and Threatened Wildlife Species in 1999, monitoring for this species must continue for five years after delisting. The Proposed Peregrine Falcon Monitoring calls for monitoring 20% of the known breeding population, including the (breeding territories) in the Colorado Plateau and adjacent low desert. Territories will be monitored for occupancy and breeding success. If it does not require an additional visit, productivity will be measured (number of chicks per territory).

California Condor

The California condor (was first listed on the Federal Endangered Species List in March 1967. A Recovery Plan for the California condor has been developed with the primary objective of bringing about the reclassification of the condor from endangered to threatened. Although the California condor is currently listed as an endangered species, the released birds in Arizona are characterized as a "10(j)" population. This refers to its experimental population status under Section 10(j) of the Endangered Species Act. By declaring the population "non-essential, experimental", the US Fish and Wildlife Service can treat condors in the project as "threatened" and develop regulations for management of the population that are less restrictive than mandatory prohibitions covering endangered species. The release site, Vermilion Cliffs in Coconino County, is on federal land managed by the Bureau of Land Management. The area is about 30 miles north of Grand Canyon National Park.

The responsibility of continued monitoring is that of the Peregrine Fund, a cooperator through the 1996 Memorandum of Understanding identifying the roles and responsibilities of various agencies and organizations identified in the California Condor Recovery Plan. However, NPS policy states that it's managers shall "manage and ensure that park operations do not adversely impact endangered, threatened, candidate, or sensitive species and their critical habitats within the park" and "to the extent possible, ensure that activities, projects, or programs outside the park do not adversely impact endangered, threatened, candidate, or sensitive species and their critical habitats" (NPS 1991).

The historic range of this large, formerly widespread vulture includes the California Coastal Ranges, Central Transverse Range, Southern Sierra Nevada Mounts, to Arizona, New Mexico, and Texas. Habitats include rocky cliffs and trees for roosting, open grasslands, and oak woodlands (USFWS 1996). There are currently approximately 160 California Condors in the world -- 47 in the wild in California and Arizona and 113 in

captive breeding facilities (World Center for Birds of Prey, Zoological Society of San Diego, and Los Angeles Zoo).

All of the Arizona birds are fitted with radios allowing field biologists to monitor their movements. Flights over the past two years have taken Arizona condors west to the Virgin Mountains near Mesquite, Nevada, south to the San Francisco peaks outside of Flagstaff Arizona, north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah and east to Mesa Verde, Colorado and the Four Corners region. Condors will take an occasional 30-mile "commute" from the Vermilion Cliffs area to the Colorado River (Peregrine Fund, 1999). Condors currently spend the majority of their perching, roosting and foraging time in Grand Canyon National Park. During the late fall and winter months they can be found along the river corridor and upper reaches of the Marble Canyon area. During spring and summer months, they routinely utilize habitat between Desert View and Hermit's Rest on the South Rim to Bright Angel Point and Cape Royal on the North Rim.

Sentry Milk Vetch

Sentry milk vetch is a dwarf milk vetch that is found on the South Rim on one site. The entire population in the park consists of fewer than 500 plants. The plant occurs in crevices and depressions with shallow soils on Kaibab limestone on a broad platform near Grand Canyon gorge, several miles from the proposed trail segments. This milk vetch apparently prefers the unshaded, well-drained soils or limestone pavement in an opening in the piñon-juniper woodland. The plant appears to occur on one specific layer of Kaibab limestone where the limestone forms a minimum-sized bench or "patio." The plant is thought to be endangered from previous trampling by park visitors and degradation of habitat. Critical habitat has not been designated.

Northern Goshawk

The northern goshawk breeds in coniferous, deciduous, and mixed forests throughout much of North America (Reynolds *et.al*, 1992). Albeit not federally listed, the goshawk is designated a "State Candidate Species" by the State of Arizona through its Game and Fish Department. The state has also placed the species in its "Wildlife of Special Concern" category with a state ranking of S3, which is defined as "rather rare throughout a fairly wide range" (AGFD, 1996). In addition, the Southwestern Regional Office of the U S Forest Service has designated the goshawk in Arizona as "Sensitive" (USDA, 1999).

On the South Rim, suitable habitat for northern goshawks includes relatively dense forest of ponderosa pine, piñon pine, and juniper. Nesting sites are typically in relatively open ponderosa pine drainages, surrounded by ponderosa pine, piñon pine, and juniper. Nests are placed in large ponderosa pines.

In 2000 on the South Rim, four nests were found and four single immature birds were observed. Each nest had two young, either branching or fledged. Three nests were located between Horsethief Tank and Highway 64, east and south of Grand Canyon village. One nest was located south of Desert View. One of the four immature northern goshawks was observed on 3 July, 2000 just outside the park boundary at the edge of Long Jim Canyon, where the canyon meets Highway 64 near the Tusayan Ranger Station.

Long Jim Canyon runs approximately four miles inside the park, then extends outside the park toward the Tusayan Ranger Station. Long Jim Canyon is a relatively open, shallow ponderosa pine drainage, surrounded by well-developed stands of piñon-juniper. There

is an unimproved dirt road that follows the bottom of the drainage that is frequently traveled by recreationists on horseback.

In 2000, the nearest known northern goshawk territory to the observed immature birds near Long Jim Canyon was approximately two miles northeast, and the nest was about three miles northeast.

Air Quality

Clean, clear air is essential to preserve the resources in the park, as well as for visitors to appreciate those resources. Grand Canyon National Park is designated a Class I attainment area under the Clean Air Act. As such, air in the park receives the most stringent protection against increases in air pollution and in further degradation of air quality related values. Air quality in the park is generally quite good. Pollution levels monitored in the park fall below the levels established by the Environmental Protection Agency to protect human health and welfare. However, the ability to see through the air (visibility) is usually well below natural levels because of human-caused air pollution. Most of this pollution originates far outside the park's boundaries and arrives in the park as a well-mixed regional haze rather than as distinct plumes from nearby point sources of pollution.

Air quality on the North and South Rims is also strongly influenced by regional conditions. During the spring and summer, pollution levels are higher. Most of this increase is from the prevailing south to southwest winds that carry pollutants from industrial and metropolitan sources in southern Arizona and California and northern Mexico. Efforts to reduce these seasonal pollution loads require regional cooperation, such as those proposed in the Grand Canyon Visibility Transport Commission's *Recommendations for Improving Western Vistas* (June 10, 1996).

The cleanest, clearest season in Grand Canyon is winter. Strong cold fronts usher in masses of clean, cold air from the northwest. A lack of pollution sources from that direction, combined with the stormy wet weather of the fronts, result in air that can be as clean as is physically possible. Between the passage of these fronts, air tends to stagnate. Pollution from local sources (generally within 100 kilometers) can become trapped under inversion layers. Local "pools" of hazy air accumulate until the next strong frontal system ventilates the region. Efforts to reduce winter haze episodes are more successful at the local scale (such as the sulfur dioxide scrubbers completed in 1999 at the Navajo Generation Station in Page, Arizona).

Relatively little air pollution is generated by activities within Grand Canyon National Park, with the exception of wildland fires. However, since these pollutants are released within the area of concern, their reduction can still help improve air quality in the park. Several programs currently underway (including mass transit, conversion of outboard motors from two to four-stroke engines, efficient facility design, etc.) benefit air quality. The park's fire management program complies fully with the Best Management Practices prescribed by the State of Arizona and the Park, and actively monitors smoke behavior to reduce its impacts on the park and surrounding area.

Cultural Resources

The National Historic Preservation Act requires agencies to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places. The process begins with an identification and evaluation of cultural resources for National Register eligibility, followed by an assessment of effect on those eligible resources, and concluding after a consultation process. If an action could change in any way the characteristics that qualify the resource for inclusion on the National Register, it is considered to have an effect. No historic properties affected means that no cultural resources are affected. No adverse effect means there could be an effect, but the effect would not be harmful to those characteristics that qualify the resource for inclusion on the National Register. Adverse effect means the effect could diminish the integrity of the characteristics that qualify the resource for the National Register.

Archaeological/Historical

Archaeological surveys have been completed for the proposed trail segments. Along the northern-most portion of the project are nine archaeological sites. The alignment of the trail has been redesigned to avoid all of these sites.

The archaeological sites located in the project area date from possibly 6300 BC through AD 1930 and are culturally affiliated with the Western Archaic, the Cohonina, Ancestral Puebloan/Anasazi, Navajo, and European-American. Cultural affiliation of several sites are either Cohonina or Puebloan, and a few are unknown. All of these sites are recommended eligible for inclusion on the National Register of Historic Places under the park's existing determination of eligibility for prehistoric and historic properties.

An abandoned dirt entrance road, constructed by Coconino County in 1920-21, is considered a linear historical property, and is found in the area of potential effect is an abandoned dirt entrance road constructed by Coconino County in 1920-21 (Unrau 1997; Anderson 1994). Although the entrance road was closed to the public in 1927, it is still used today as a two-track road for administrative operations. No features were located along the roadway, other than a wildlife tank and a single masonry culvert along the dirt road. An exact date for the construction of the features could not be determined. The features are most likely associated with the Civilian Conservation Corp (CCC) era, not with the original construction of the road as historical documents do not mention their existence during that period and the construction methods are similar to other CCC projects. The property only partially meets the criteria of significance under National Register Criteria A and it does not meet Criteria B, C, or D. Therefore it is believed to be ineligible for the National Register.

Ethnographic Resources

The lands of Grand Canyon National Park are traditionally affiliated with several tribes of the southwest – the Havasupai, Hopi, Hualapai, Kaibab Band of Paiute, Navajo Nation, Paiute Indian Tribe of Utah, White Mountain Apache, San Juan Southern Paiute, and Zuni Tribes. No ethnographic resources affiliated with these tribes (e.g., funerary objects, sacred objects, objects of cultural patrimony, plant gathering areas, or ceremonial sites) are known to occur in either the project area or its general vicinity. American Indian tribes with cultural affiliation to the park will have an opportunity to comment on the draft Environmental Assessment. If ethnographic resources are identified during that time,

consultation with appropriate tribal representatives would be conducted and mitigation measures developed.

Visitor Experience

Recreation Resources

Residents of Tusayan and Grand Canyon Village, as well as some visitors to the park bike and/or walk along Highway 64 to access the park and Tusayan. As there are no bike lanes available, traveling on the highway creates a safety concern. Residents in the area are known to use the trails and two-tracks around Tusayan and in the park for bicycle riding. A demand exists for additional trails that connect one destination with another. The connection with the Arizona Trail to the South Rim is important for users of the trail.

The existing trails and two-track trails in the project area are used for hiking and mountain bike riding. Presently, they do not form a system of continuous trails that lead to a particular destination. Some portions of the trails and two-tracks are used as an alternative route from walking or riding on the shoulder of Highway 64. The amount of use on the trails is considered low; however, no official data has been compiled.

Introduction

This chapter describes the direct, indirect, and cumulative environmental consequences of the alternatives. It is organized by alternative, with environmental consequences discussed under each resource. Environmental consequences are the effects and impacts on the physical, biological, social, and economic environment that may be caused by implementing an alternative. Environmental consequences result from the level and type of development that either is proposed or may be expected from each alternative.

Methodology

The impact analyses and conclusions in this documentation are based on the review of existing literature and park studies; information provided by experts within the National Park Service; and professional judgments of third-party consultants.

Direct effects are defined as those that occur at the same time and place as the action. For example, a direct impact of construction activities in forested land would be the removal of trees and other vegetation.

Indirect effects are those that are spatially removed from the activity or occur later in time but are considered likely in the foreseeable future. For example, impacts to archaeological sites from trail users venturing off the designated trail.

Thresholds of Change

Intensity and duration define the thresholds of change of the impact on a resource. For the purposes of this analysis, intensity is defined as follows:

Negligible Impact:	barely perceptible and not measurable and/or confined to a small area
Minor Impact:	perceptible and measurable, but is localized
Moderate Impact:	clearly detectable and could have appreciable effect on the resource
Major Impact:	would have a substantial, highly noticeable influence on the resource

The duration of impact, for the purposes of this analysis, are defined as follows:

Short-term: occur during implementation of the alternative, primarily construction related activities

Long-term: extend beyond implementation of the alternative and would likely have permanent effects on the resource

Cultural Resources and Section 106 of the National Historic Preservation Act

In this environmental assessment, impacts to cultural resources are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the CEQ that implement the NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualify it for inclusion in the National Register, (e.g. diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of no adverse effect means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the NPS's Conservation Planning, Environmental Impact Analysis and Decision-making (DO-12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g. reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact from mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Although adverse effects under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis sections for cultural resources under the preferred alternative. The Section 106 Summary is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

The Grand Canyon National Park also has a programmatic agreement (1995) with the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation regarding the implementation of the park's General Management Plan. This agreement will be followed on this proposed project.

Impairment of Park Resources or Values

In addition to determining the environmental consequences of the alternatives, NPS policy (Management Policies 2001) requires analysis of potential effects to determine whether or not actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's GMP or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

Cumulative Impacts

Cumulative impacts are the incremental impacts of direct and indirect effects of the action added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes these additional actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. Cumulative

effects for this analysis include the mass transit system that is to be constructed between Tusayan and Canyon View Information Plaza and Greenways within the South Rim. The NPS is proposing a mass transit system that may use land to the west of the project area across and parallel to Highway 64. The proposed trail segments analyzed in this document are part of a Greenway system within the South Rim. Four other miles of trail have been previously approved and will be constructed before this project would begin.

Alternative A – No Action

Natural Resources

Geology/Soils

Direct/Indirect Impacts: No action in this analysis means that the 2.3 miles of Greenway trail that are proposed in undisturbed areas would not be built. Therefore, there would be no change in soil conditions.

Cumulative Impacts: As no new construction activities would occur, there would be no cumulative impacts to geology or soils as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to geology or soils from implementing no action.

Biotic Communities

Vegetation

Direct/Indirect Impacts: As no new ground disturbing activities would occur, there would be no direct impacts to vegetation. The introduction of exotic plants or noxious weeds is greatest when there is ground disturbance; however, there is a slight potential for existing trail users to bring exotic or noxious weeds into the park when using the existing trail system and two-tracks, for example by carrying seeds on their clothes, shoes, or tires which are eventually dispersed along the trails or roads. This action, however, would likely result in a negligible impact. Ongoing programs that focus on exotic plant and noxious weed control would continue as budgets and schedules allow.

Cumulative Impacts: Existing development has created disturbances that have allowed the introduction of exotic plants and noxious weeds into the park. Use of the existing trails combined with foreseeable future projects in the area would increase the potential for noxious weeds and exotic plants to spread in the park at a rate that may be difficult for

the existing control programs to manage. Mitigation measures would be implemented for any future projects to reduce the potential for spread or introduction of exotic plants or noxious weeds, but no mitigation has been suggested to reduce the potential for impacts from existing trail use.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be negligible direct or indirect impacts to vegetation. Cumulatively, impacts to vegetation would be minor over the long-term.

Wildlife

Direct/Indirect Impacts: As the trail would not be constructed, use of the exiting trails is expected to continue at the present levels, which has not been quantified but thought to be low. Since the existing use of the trails is not expected to increase significantly, impacts to wildlife would be negligible.

Cumulative Impacts: Wildlife habitat has been lost in and around the project area from past developments. Although no trails would be build under this alternative, the existing trails and two-tracks would continue to be used by visitors and residents in the area, which may disturb wildlife, but at a negligible level. Future projects (e.g. the mass transit system) may increase the potential for wildlife to be killed by mass transit vehicles (trains or buses), but would significantly reduce the potential for wildlife to be killed from private vehicles, as most visitors would park in Tusayan and use the mass transit system in the park. Collectively, all the projects in this area have been designed to use areas that have already been disturbed to the extent practicable in order to minimize impacts to wildlife habitat and the environment.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be negligible, long-term, direct, indirect, or cumulative impacts to wildlife from implementing no action.

Threatened and Endangered /Special Status Species

Mexican Spotted Owl

Direct/Indirect Impacts: No construction activities are proposed under this alternative. There would be no impact to the owl or to owl territories from this alternative.

Cumulative Impacts: There would be no cumulative impacts to Mexican spotted owls as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There is no impact to the owl or to owl territories from this alternative.

Peregrine Falcon

Direct/Indirect Impacts: No construction activities are proposed under this alternative. There would be no impact to the peregrine falcon or its foraging habitat from this alternative.

Cumulative Impacts: There would be no cumulative impacts to peregrine falcons as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There is no impact to the peregrine falcon or its foraging habitat from this alternative.

California Condor

Direct/Indirect Impacts: No construction activities are proposed under this alternative. Therefore, there would be no impact to the condor or its foraging habitat from this alternative.

Cumulative Impacts: There would be no cumulative impacts to California condors as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to the condor or its foraging habitat from this alternative.

Sentry Milk Vetch

Direct/Indirect Impacts: There is no impact to the Sentry milk vetch from this alternative.

Cumulative Impacts: There would be no cumulative impacts to the Sentry milk vetch as a result of implementing this alternative.

Impairment: There would be no impairment of the park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to the Sentry milk vetch from this alternative.

Northern Goshawk

Direct/Indirect Impacts: There would be no impact to the goshawk or its foraging habitat from this alternative.

Cumulative Impacts: There would be no cumulative impacts to northern goshawks as a result of implementing this alternative.

Impairment: There would be no impairment of the park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be no impact to the goshawk or its habitat from this alternative.

Air Quality

Direct/Indirect Impacts: Continued use of the existing trails and two-tracks in the area for hiking and bicycle riding without a hardening agent on the surface would cause fugitive dust emissions. However, the volume of traffic on the trails and tracks are expected to be light and have a negligible impact on air quality.

Cumulative Impacts: There would be no cumulative impacts to air quality as a result of implementing this alternative.

Impairment: There would be no impairment of the park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be negligible impacts to air quality from this alternative.

Cultural Resources

Archaeology

Direct/Indirect Impacts: No ground disturbing activities would be conducted under this alternative; therefore, there would be no direct impact to archaeological sites. Archaeological sites may be indirectly impacted from users of the existing trails and two-tracks in the area. Current NPS management actions and policies regarding cultural resources would continue, but may not be able to effectively monitor these sites under this action. No data would be collected and the sites would be left as they are. This would likely result in a minor, long-term impact.

Cumulative Impacts: Use of the existing trails and two tracks along with other foreseeable development could result in a long-term minor risk that archaeological resources may be disturbed or diminished without an adequate increase in the park archaeologists ability to monitor resource conditions and implement measures to mitigate impacts. Typically, measures are implemented as part of any development that would minimize the disturbance or loss of data from archaeological sites.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Indirectly, this action may have a long-term minor impact on archaeological resources in the area surrounding the existing trails. Cumulatively, it may also result in a minor, long-term impact.

Historic

Direct/Indirect Impacts: No ground disturbing activities would be conducted under this alternative; therefore, there would be no direct impact to historic sites. No improvements or measures would be implemented to control erosion of the historic entrance road. Erosion would be expected to continue during periods of heavy precipitation, which would have a minor, long-term impact.

Cumulative Impacts: Use of the existing trails and two tracks along with other foreseeable development could result in a long-term minor risk that historic resources may be disturbed or diminished without an adequate increase in the park archaeologists ability to monitor resource conditions and implement measures to mitigate impacts. Typically, measures are implemented as part of any development that would minimize the disturbance or loss of data from archaeological sites.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing

legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Indirectly, this action may have a long-term minor impact on historic properties. Cumulatively, it may also result in a minor, long-term impact.

Ethnographic Resources

Direct/Indirect Impacts: No ethnographic resources are known to exist within the project area; therefore, no impacts are anticipated.

Cumulative Impacts: No ethnographic resources are known to exist within the project area; therefore, no impacts are anticipated.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: No ethnographic resources are known to exist within the project area; therefore, no impacts are anticipated.

Visitor Experience

Recreation Resources

Direct/Indirect Impacts: The recreation opportunities would not change if this alternative were selected. The existing safety concerns of using Highway 64 for walking and riding bicycles would still exist. In addition, users would not have the benefit of a trail system that would link Tusayan with Grand Canyon facilities.

Cumulative Impacts: There would be no cumulative impacts to recreation as a result of implementing this alternative. However, the opportunity to provide a connection for the Arizona Trail from National Forest land into the park would not be realized.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: There would be moderate long-term impacts to recreation from implementing no action.

Alternative B – Preferred Alternative

Natural Resources

Geology/Soils

Direct/Indirect Impacts: Soils within the proposed alignment for the trail would be graded, stabilized, and a hardening agent applied to the surface. The total length of the proposed trail segments is 2.3 miles. In clearing a 12-foot wide swath in preparation for the trail bed, a total area of approximately 3.35 acres would be disturbed. Upon completing construction, the proposed trail would be ten-feet-wide with a water-permeable crushed aggregate, which would withstand snow plowing. Short sections of trail that experience problematic erosion would be paved with asphalt.

To minimize short-term impacts, the trail would be constructed using light duty equipment (small bobcat and backhoe) and in small increments. Disturbance outside of the proposed trail bed would be minimal.

Best Management Practices (BMP's) that pertain to this project would be followed to minimize the long-term impacts that would result from construction of the proposed trail segments. BMPs cover activities such as erosion prevention and control measures, revegetation, general guidelines for the location and design of roads and trails, equipment maintenance, construction practices, and others.

Cumulative Impacts: The implementation BMP's described in the previous section during construction of the trail segments and the mass transit system should result in a negligible impact to soils.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Short-term impacts would be minor. Long-term impacts, primarily erosion potential would be negligible. Cumulatively, impacts would be negligible.

Biotic Communities

Vegetation

Direct/Indirect Impacts. A 12-foot-wide corridor would be cleared of all vegetation, equating to approximately 3.35 acres of disturbance. To reduce long-term impacts to plant life, the trail would be designed in such a way as to place it in areas with the least amount of vegetation. Plants to be cleared from this area would be removed by NPS personnel to be used in other projects or to revegetate areas of the trail that have been disturbed. Side slopes adjacent to the trail would be seeded with native grasses wherever necessary. Hitching posts would be provided at the ends of the trail and at rest stops to prevent harm to trees along the trail.

The potential for introduction of non-native plant species exists from trail construction. To reduce this risk, borrow material would be obtained from sources within the park that are known to be free of non-native plants. If this is not possible, the park's restoration biologist would approve any borrow material site outside the park. The borrow material obtained outside the park would be capped with borrow material obtained within the park. Additionally, all machinery used in the project would be cleaned and inspected prior to entering the project areas to reduce the risk of introducing exotic plant seeds and vegetative material. The park is developing a policy on weed-free hay and feed for livestock entering the park so that the introduction of additional exotic species would be reduced. This policy is not in effect at this time and will be addressed at a later date.

Cumulative Impacts: Existing development has created disturbances that have allowed the introduction of exotic plants and noxious weeds into the park. Constructing the proposed trail segments combined with foreseeable future projects in the area would increase the potential for noxious weeds and exotic plants to spread in the park at a rate that may be difficult for the existing control programs to manage. Mitigation measures would be implemented for any future projects, including the greenway trail segments, to reduce the potential for spread or introduction of exotic plants or noxious weeds. The future weed-free hay and feed policy could help to reduce the introduction of exotic plants and noxious weeds as well.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Enacting erosion control measures during construction would reduce potential for erosion of soil and surrounding vegetation, making the short-term impact to vegetation negligible. Long-term impacts to vegetation would be minor. Cumulative impacts would also be minor and long-term.

Wildlife

Direct/Indirect Impacts: The proposed development may have an adverse effect on individual native species and on localized natural processes. Population level effects are not anticipated for any species. Placement of the trail was designed to decrease habitat

fragmentation and subsequent wildlife mortalities. Wildlife may be temporarily displaced from the area during construction activities (short-term), but given the expected future volume of traffic the trail would receive, wildlife would be expected to return to use the area after construction activities have been completed. The use of mitigation measures including wildlife-proof trash containers and signs with, "Do Not Feed or Approach Wildlife," would be placed where necessary, to reduce possible impacts to wildlife from trail users.

Cumulative Impacts: Cumulative impacts from past, present and foreseeable future actions would include habitat loss and wildlife disturbance. Since the greenway trail and the mass transit system are concentrated in one area and parallel the existing highway, wildlife habitat fragmentation would be minor. The loss of habitat would be expected to be negligible given the amount of ponderosa pine habitat present in the park and that fact that the proposed trail segments and the future mass transit system have been designed to be constructed in previously disturbed areas to the extent possible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Short-term impacts to wildlife would be minor. The use of mitigation measures would reduce possible impacts to wildlife; therefore, long-term impacts to wildlife would be negligible to populations but may be adverse to individuals. Cumulative impacts would be minor.

Threatened and Endangered /Special Status Species

Mexican Spotted Owl

Direct/Indirect Impacts: A limited number of studies have evaluated the effects of human-induced disturbance and noise on raptors. Predictably, raptor responses to noise and disturbance in these studies have varied. Most studies reported relatively minor impacts and many of these found effects to be temporary (Lamp 1987). In the few cases where reproductive success was evaluated, reproductive parameters were sometimes affected, but not to a large degree. The study discussed below evaluated noise sources from ground-based activities and reported that nesting raptors were sensitive to ground-based activities.

Swarthout and Steidl (2001) examined the effects of backcountry recreation on Mexican spotted owls in Utah. They observed that, with the approach of a hiker, juveniles and adults were unlikely to flush at distances > 12m and > 24m, respectively, and neither age-class was likely to alter their response at all when hikers were at distances > 55m. The presence of small numbers of visitors rather than a single hiker would no doubt increase flush response, but to what degree is unknown. Aside from flush response, Swarthout and Steidl (2001) examined other behavioral traits and noted that activity budgets did not change markedly when hikers passed near nests every 15 minutes. During the disturbance periods, females decreased the amount of time they handled prey by 57% and increased contact vocalizations by 58%, but were otherwise unaffected.

The Mexican spotted owl's seemingly preferred habitat of steep canyons below the rim in Grand Canyon suggest that visitor intrusion may often be obscured from owls, but that the high canyon walls may also amplify the stimuli and repeat it through echoes. Presently known owl locations would place this particular portion of the proposed trail beyond 1000 feet of Protected Activity Centers (PACs), but if owls are using the upper reaches of presently occupied side canyons, disturbance to owls may well result. If this results in increased metabolic costs, nest abandonment or lessened reproductive success, a "take" of Mexican spotted owls will occur. However, at this time, we have no studies regarding prey base and use of rims for foraging activity by Mexican spotted owls.

The possibility that visitors or backcountry recreationists using this portion of the trail are affecting Mexican spotted owls in the park is considered very unlikely. All owls located to date within the park were encountered in side canyons below the rim in very rugged terrain without trails. Although it is difficult to monitor these owls, there is no evidence indicating visitors are altering owl nesting or productivity. As owls have been located below the Yaki Point area, this portion of the Greenway Trail actually guides visitors away from and to the west of these owls.

Implementation of construction activities during the non-breeding season is expected to minimize the adverse impacts to the owls. Consultation with the USDI Fish and Wildlife Service will be completed prior to the project implementation.

Cumulative Impacts: The greenway trail segments and other foreseeable projects may affect spotted owl habitat, primarily foraging habitat. These projects could also increase disturbance to the owls during construction. Mitigation measures would be implemented whenever appropriate for present and future projects that would limit disturbance during the spotted owl breeding season. Therefore, the cumulative impacts would be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project may affect but is not likely to adversely affect the Mexican spotted owl or its habitat.

Peregrine Falcon

Direct/Indirect Impacts: The closest active peregrine falcon territory is four miles from the project area. Although peregrine falcons have been observed flying over forested areas of the park, main foraging areas that have been documented are limited to the rim, about one-half mile into the forest area from the rim, and river areas at the bottom of the canyon where prey is abundant. It is possible that peregrine falcons could fly over the project area; however, the project area does not fall within any of the defined foraging areas; therefore, impacts to this raptor are negligible.

Cumulative Impacts: Foreseeable future projects as well as the greenway trail segments would occur in already disturbed areas to the extent possible and would not affect the prey base for foraging peregrine falcons. None of the foreseeable actions would affect nesting habitat. Therefore, cumulative impacts to peregrine falcons would be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have no effect on the peregrine falcon.

California Condor

Direct/Indirect Impacts: Impacts to condors from the preferred alternative may occur in the form accidental displacement when visitors using the trail flush startled individuals from perch or roost sites. Conservation measures would include the daily monitoring of condors and their whereabouts. Should condors be perching, roosting or foraging in an area accessible to visitors using this trail corridor, portions of the trail may be closed temporarily until condors are hazed by NPS/Peregrine Fund staff, leave on their own, or have completed foraging activities.

Cumulative Impacts: Park Service staff have developed mitigation measures to protect condors that utilize habitat in the park from visitors and construction activities. Therefore, cumulative impacts from past, present, and foreseeable actions would be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project may affect, but is not likely to adversely affect the California condor.

Sentry Milk Vetch

Direct/Indirect Impacts: The Sentry milk vetch is known from only one location on the South Rim, which is several miles from the project area. No plants were discovered during biological surveys of the project area.

Cumulative Impacts: There would be no cumulative impacts to the Sentry milk vetch as a result of implementing this alternative.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have no effect on the Sentry milk vetch.

Northern Goshawk

Direct/Indirect Impacts. The preferred alternative should have a no impact on the adjacent goshawk territories. However, annual monitoring of the goshawk territories in the greater area, focusing on nest sites and nest site productivity, would continue to determine if trail use is impacting this species.

Cumulative Impacts. The greenway trail segments and other foreseeable projects may affect northern goshawk habitat, primarily foraging habitat. These projects could also increase disturbance to the goshawks during construction. Mitigation measures would be implemented whenever appropriate for present and future projects that would limit disturbance during the northern goshawk breeding season. Therefore, the cumulative impacts would be negligible.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: The proposed project would have no effect on the Northern goshawk.

Air Quality

Direct/Indirect Impacts: Short-term impacts to air quality from construction activities would be expected from increased dust and combustion-related emissions. Dust raised during earth moving activities would be limited by the size of equipment used (bobcat and backhoe). Fugitive emissions from traffic in the project area can be controlled by water sprinkling. Limiting engine idling to five minutes or less would reduce engine exhaust emissions.

If asphalt were used in the trail construction to prevent erosion, the use of an emulsion-based or slow-cured asphalt, rather than a solvent-based ("Cutback") asphalt would be investigated. These types of asphalts are preferred because they reduce emissions or pollutant concentrations. However, if they cannot be prepared inside the park, they would need to be transported from Phoenix, which may limit their practicality because of the need to maintain an acceptable temperature. The pollutants of concern are volatile organic compounds, or VOC's, which play a major role in ozone formation. While park ozone levels are below EPA standards at present, they are rising annually.

Long-term impacts to air quality are expected to be minimal, as the surfacing of the trail would reduce dust and erosion. While use of the trail would increase, the low-speed travel of the users would not be expected to create appreciable fugitive dust that could affect air quality.

Cumulative Impacts: The implementation of a mass transit system for visitors at the South Rim would improve air quality at Grand Canyon National Park by eliminating the majority of private vehicle use in the park. Short-term impacts to air quality from construction activities would be similar to those described under the direct and indirect

impacts section, and with the implementation of mitigation measures should result in a negligible impact.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Short-term impacts to air quality would be minor. Long-term impacts to air quality are expected to be minor. Cumulative impacts would be negligible.

Cultural Resources

Archaeology

Direct/Indirect Impacts: Potential for indirect impacts exists for at least eight of the nine known archaeological sites adjacent to the trail. These sites are not in immediate danger of being impacted by the proposed project, but could be affected by users venturing off the trail. However, the future volume of use of the trail is unknown and whether the users would stay on the trails and leave the sites alone is also unknown. Therefore, an archaeological site-monitoring program would be initiated to determine if trail usage would result in indirect impacts to these cultural resources. This monitoring program is included in The Grand Canyon Village Trail Enhancement Project Mitigation Plan (Moffitt, Moffitt, Schroeder, Horn-Wilson 2000), which has received concurrence from the Arizona State Historic Preservation Office. If impacts are found to be occurring from trail use, then the effected sites would be mitigated according to the plan and subsequent site-specific mitigation plans.

Activities associated with trail construction are not expected to directly impact any archaeological resources.

Cumulative Impacts: Trail use along with other foreseeable development could result in a long-term minor risk that archaeological resources may be disturbed or diminished without an adequate increase in the park archaeologist's ability to monitor resource conditions and implement measures to mitigate impacts. Typically, measures are implemented as part of any development that would minimize the disturbance or loss of data from archaeological sites to a negligible level.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Section 106 Summary: There would be no impacts to known archaeological resources. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR § 800.5, Assessments of Adverse Effects), implementation of the preferred alternative would have no adverse effect on any National Register eligible sites or properties.

Conclusion: With implementation of the mitigation measures identified in Chapter 2, short-term and long-term impacts would be negligible. Cumulative impacts to cultural resources would also be negligible.

Historic

Direct/Indirect Impacts: No improvements would be made to the existing historic entrance road. Erosion would be expected to continue during periods of heavy precipitation.

Cumulative Impacts: Constructing the trail segments along with other foreseeable development could result in a long-term minor risk that historic resources may be disturbed or diminished without an adequate increase in the park archaeologists ability to monitor resource conditions and implement measures to mitigate impacts. Typically, measures are implemented as part of any development that would minimize the disturbance or loss of data from archaeological sites to a negligible level.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Section 106 Summary: There would be no impacts to known historic properties. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR § 800.5, Assessments of Adverse Effects), implementation of the preferred alternative would have no adverse effect on any National Register eligible sites or properties.

Conclusion: There would be negligible impacts to historic properties from implementing the preferred alternative.

Ethnographic Resources

Direct/Indirect Impacts: No ethnographic resources are known to exist within the project area; therefore, no impacts are anticipated.

In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed.

Cumulative Impacts: No ethnographic resources are known to exist within the project area; therefore, no impacts are anticipated.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Section 106 Summary: There would be no impacts to known ethnographic resources. After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR § 800.5, Assessments of Adverse Effects), implementation of the preferred alternative would have no adverse effect on any National Register eligible sites or properties.

Conclusion: No ethnographic resources are known to exist within the project area; therefore, no impacts are anticipated.

Visitor Experience

Recreation Resources

Direct/Indirect Impacts: Portions of existing roads that would be used for the greenway trail system would be closed during construction. The present level of use of these roads is unknown, but thought to be very light. Recreationists that use these trails would not be allowed access to those portions of the trails during construction.

Implementing this action would provide a separate path away from Highway 64 that would eliminate the safety concerns on the highway except where, in two locations, the Greenway trail would cross the highway. It would also provide a complete and separate trail between Tusayan and Canyon View Information Plaza that would have destinations at both ends. It would provide a developed recreation opportunity for hikers, bicyclists, and equestrians to use any part of it with a standard above the existing level of the existing undeveloped trails and two-tracks. Some users who are more attracted to undeveloped trails would find the level of improvements of the new trail above their liking and the challenge level to be fairly low. Safety signing will educate users how to yield to hikers, bicyclists, and equestrians to reduce any conflicts on the trail.

Cumulative Impacts: Cumulatively, the Greenway trail benefits the visitor experience by increasing the number of ways in which visitors can experience the park—an objective stated in the GMP. The trail may also be used in the future as a connector into the park from the Arizona Trail that presently ends on National Forest land.

Impairment: There would be no impairment of the Grand Canyon National Park's resources or values if this alternative were implemented. This is concluded because no major adverse impacts would occur. Specifically, no major adverse impacts would occur to necessary resources needed to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or resources that are key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or resources identified as a goal in the park's general management plan or other relevant NPS planning documents.

Conclusion: Short-term impacts would be minor. This action would result in a long-term moderate beneficial effect on recreational resources in the park.

Introduction

This chapter identifies the persons responsible for preparing this document; lists the individuals that were consulted or coordinated with for information regarding the document content, and provides a bibliographic citation for all referenced material. During the preparation of this EA, input was also received from federal, tribal, and county agencies, non-governmental organizations, and private individuals. These entities are listed at the end of this chapter.

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Consultation/Coordination

The following agencies, organizations and tribes were contacted for information or assisted in identifying important issues or analyzing impacts.

Agencies

Arizona Game and Fish Department

Phoenix Office

Arizona State Historic Preservation Office

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Grand Canyon National Park Foundation

Deborah Tuck, Director

Tribes

Havasupai Tribe

Hopi Tribe

Hualapai Tribe

Kaibab Band of Paiute Indians

Navajo Nation

Paiute Indian Tribe of Utah

Pueblo of Zuni

San Juan Southern Paiute Tribe

White Mountain Apache

References

- Anderson, Michael R. 1994. Historic American Engineering Report, South Entrance Road (Grand Canyon Route #2), HAER No. AZ-45.
- Arizona Game and Fish Department. 1996. Wildlife of Special Concern in Arizona (Draft). Nongame Branch, Phoenix, AZ. March 1996.
- Brown, Bryan T. 1990. Grand Canyon Peregrine Falcon Population Study: 1990 Monitoring Study. SWCA Inc., Environmental Consultants. Report on file (GRCA WILD 950104), Grand Canyon Science Center, Grand Canyon National Park, Arizona.
- Ganey, J. L and R. P. Balda. 1989. Distribution and habitat use of Mexican spotted owls in Arizona. *Condor* 91:355-361.
- Grand Canyon National Park. 1995. Final General Management Plan. Grand Canyon National Park, Arizona.
- Grand Canyon National Park. 1995. Final Environmental Impact Statement. Grand Canyon National Park, Arizona.
- Grand Canyon National Park. 1995. Draft Environmental Impact Statement. Grand Canyon National Park, Arizona.
- Grand Canyon National Park. 2000. Categorical Exclusion: NEPA Clearance for Work Projects and Activities. CE #9905. Grand Canyon National Park, Arizona.
- Grand Canyon Visibility Transport Commission. 1996. *Recommendations for Improving Western Vistas*. Grand Canyon National Park, Arizona.
- Gutierrez, R.J., A.B. Franklin, and W.S. LaHaye 1995. *Spotted Owl. The Birds of North America. No. 179*.
- Lamp, R.E. 1987. Monitoring the Effects of Military Air Operations at NAS Fallon on the Biota of Nevada. Job Progress Report for the Year 1986-87. Governor's Office of Community Services, Carson City, Nevada.
- Leslie, Elaine. 1994-1999. Grand Canyon National Park unpublished report on survey and monitoring of South Rim peregrine eyries.
- Mattoon, W.R. 1909. A Working Plan for Grand Canyon National Monument. Forest Service, District 111, USDA. Ms. On file (GRCA 58395), Museum Study Collections, Grand Canyon National Park, Arizona.
- Mattoon, W.R. 1910. A Town Site Plan for Grand Canyon National Monument; Also Drift Fence and other Improvements, Tusayan National Forest. USDA, Forest Service. MS. On file (GRCA 17460), Museum Study Collections, Grand Canyon National Park, Arizona.
- Moffitt, Steve, et al. 2000. The Grand Canyon Village Trail Enhancement Project Mitigation Plan, Grand Canyon National Park, Arizona. NPS.

- Peregrine Fund. 1999. Information extracted from "Notes from the Field" Available on Internet [http: www.peregrinefund.org/notescondor.html](http://www.peregrinefund.org/notescondor.html).
- Reynolds, et. al. 1992. Management Recommendations for the Northern goshawk in the Southwestern United States. USDA Forest Service RM-217.
- Rinkevich, S. E., J. L. Ganey, W. H. Mow, F. P. Howe, F. Clemente, and J. F. Martinez-Montoya. 1995. Recovery Units. Pages 36-51 in USDI Recovery Plan for the Mexican spotted owl. Vol I. USDI Fish and Wildlife Service. Albuquerque, N. M.
- Schaffer, M.L. 1985. The metapopulation and species conservation: the special case of the northern spotted owl. Pages 86-99 in R.J. Gutierrez and A.B. Carey, eds. Ecology and management of the northern spotted owl in the Pacific northwest. USDA Forest Service. Gen. Tech. Rep. PNW-185, Portland, Oreg.
- Swarthout, E.C. and R.J. Steidl 2001. Flush Responses of Mexican Spotted Owls to Recreationists. *Journal of Wildlife Management*. 65(2): 312-317
- Unrau, Harian. 1997. Evaluation of Historical Significance and Integrity of Old South Entrance Road, Grand Canyon National Park, Arizona. NPS, Denver Service Center, Resource Planning.
- US Dept. of Agriculture (USDA), Southwestern Region (3). 1999. Current Sensitive Species List. Attached to a letter addressed to Forest Supervisor's and Staff Directors from Regional Forester on July 21, 1999.
- USDA Forest Service. 1991. Inventory and monitoring protocols for the Mexican spotted owl in the Southwest Region.
- USDI Fish and Wildlife Service. 1995. Recovery Plan for the Mexican spotted owl: Vol. I. Albuquerque, New Mexico. 172 pp.
- USDI Fish and Wildlife Service. 1996. Endangered and Threatened Wildlife and Plants: Establishment of a nonessential experimental population of California condors in Northern Arizona. *Federal Register*, October 16, Volume 61, Number 201, pp. 54043-54060.
- USDI National Park Service. 1995. Programmatic Agreement Among The National Service, The Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Draft General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona.
- USDI National Park Service. 1991. Natural Resources Management Guidelines, NPS-77. Washington, D.C.
- Willey, D. W. 1992. Spotted owl inventory in Grand Canyon National Park. Submitted to Grand Canyon National Park, Natural Resources Division.
- Willey, D. W. 1996 Inventory for Mexican spotted owls on the North Rim of Grand Canyon National Park. Final Report.

Willey, D.W. 1999. Inventory for Mexican spotted owls on the North Rim of Grand Canyon National Park. Final Report.

Willey, D. W. and R.V. Ward. In-prep. Inventory for Mexican spotted owls on the North Rim of Grand Canyon National Park. Final Report 2001.

Willey, D. W. and R.V. Ward. In-prep. Inventory for Mexican spotted owls in Side Canyon habitat of Grand Canyon National Park. Interim Report 2001.

Federal Acts, Orders, Policies and Directives

Director's Order – 2 Park Planning

Director's Order – 12 Conservation Planning, Environmental Impact Analysis, and Decision-making

Director's Order – 28 Cultural Resource Management Guidelines

Director's Order – 47 Sound Preservation and Noise Management

Management Policies 2001

NPS – 77 Natural Resources Management Guidelines

40 CFR § 1500 *et seq.* National Environmental Policy Act

36 CFR § 800 Protection of Historic Properties

Department Manual (U.S. Department of Interior) Part 516

Organic Act of 1916

Antiquities Act of 1906

42 USC 7401 *et seq.* Clean Air Act § 118

Federal Water Pollution Control Act of 1972

Executive Order 12898 Environmental Justice Guidance

Executive Order 11988 Floodplain Management

Scoping Responses

Comments were received in response to the public scoping letter from the following agencies and organizations, as well as four private individuals.

Federal Agency

U.S. Fish and Wildlife Service

Tribal Agency

The Hopi Tribe

County Agency

Coconino County, Parks & Recreation, Fair & Racing

Non-governmental Organization

Arizona Trail Association

Arizona Bicycle Club

Private Individuals (4)

Names Intentionally Withheld

Original EA Review Responses

Comments were received in response to the original environmental assessment from the following agencies and organizations.

State Agency

The State Historic Preservation Office

Tribal Agency

The Navajo Nation

County Agency

Coconino County Parks and Recreation, Fair and Racing

Non-governmental Organization

The Arizona Trail Association

Back Country Horsemen of America (two letters)

International Mountain Bicycling Association

APPENDIX A
US Fish and Wildlife Service
List of Special Status Species



United States Department of the Interior

U.S. Fish and Wildlife Service

2321 West Royal Palm Road, Suite 103

Phoenix, Arizona 85021-4951

Telephone: (602) 242-0210 FAX: (602) 242-2513



In Reply Refer To:

AESO/SE
2-21-01-I-230

April 12, 2001

Memorandum

To: Superintendent, Grand Canyon National Park, Grand Canyon, Arizona

From: Field Supervisor

Subject: Greenway Trail System (CVIP to Grand Canyon Transit Center)

This memorandum responds to your March 27, 2001, request for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Coconino County). The attached list may include candidate species as well. We hope the attached county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-01-I-230.

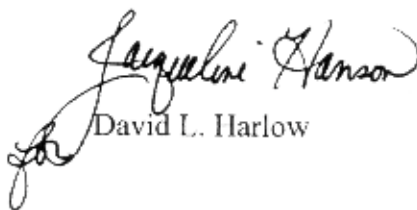
The attached list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the attached lists are the Code of Federal Regulations (CFR) citation for each list and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency must enter into a section 7 conference with the Service. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please feel free to contact Tom Gatz.



David L. Harlow

Attachment

cc: John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY:
03/02/2001

COCONINO

1) LISTED

TOTAL= 15

NAME: **BRADY PINCUSHION CACTUS** *PEDIOCACTUS BRADYI*
STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 44 FR 61784, 10-26-1979
DESCRIPTION: SMALL, SEMI-GLOBOSE CACTUS, 2.4 INCHES TALL AND 2 INCHES IN
DIAMETER. SPINES ARE WHITE OR YELLOWISH-TAN. THE SPINE
CLUSTERS 1-2 CENTRAL SPINES & 14-15 SPREADING RADIAL SPINES. ELEVATION
FLOWER: STRAW YELLOW PRODUCED AT TOP OF THE STEM RANGE: 3850-4500 FT.
COUNTIES: COCONINO
HABITAT: BENCHES & TERRACES IN NAVAJO DESERT NEAR MARBLE GORGE.

SUBSTRATE IS KAIBAB LIMESTONE CHIPS OVER MOENKOPi SHALE AND SANDSTONE SOIL. PLANT COMMUNITY
DOMINATED BY SHADSCALE (ATRIPLEX CONFERTIFOLIA), SNAKEWEED (GUTEIERREZIA SAROTHRAE), MORMON
TEA (EPHEDRA VIRIDIS), AND DESERT TRUMPET (ERIOGONUM INFLATUM). PROTECTED BY CITES AND ARIZONA
NATIVE PLANT LAW.

NAME: **NAVAJO SEDGE** *CAREX SPECUICOLA*
STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 50 CFR 19373, 5-8-85
DESCRIPTION: PERENNIAL FORB WITH TRIANGULAR STEMS, ELONGATED RHIZOMES.
FLOWER: WHITE JUNE AND JULY ELEVATION
RANGE: 5700-6000 FT.
COUNTIES: COCONINO, NAVAJO, APACHE
HABITAT: SILTY SOILS AT SHADY SEEPS AND SPRINGS

DESIGNATED CRITICAL HABITAT IS ON THE NAVAJO NATION NEAR INSCRIPTION HOUSE RUINS. FOUND AT SEEP
SPRINGS ON VERTICAL CLIFFS OF PINK-RED NAVAJO SANDSTONE.

NAME: **SAN FRANCISCO PEAKS GROUNDSEL** *SENECIO FRANCISCANUS*
STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 48 FR 52743, 11-22-1983
DESCRIPTION: MEMBER OF SUNFLOWER FAMILY, DWARF ALPINE SPECIES 1.2-4
INCHES TALL. LEAVES DEEPLY LOBED. FLOWERS: 0.5 INCH DIAMETER 1-
6 YELLOW-GOLD FLOWERS. ELEVATION
RANGE: 10900+ FT.
COUNTIES: COCONINO
HABITAT: ALPINE TUNDRA

DESIGNATED CRITICAL HABITAT IS SAN FRANCISCO PEAKS. FOUND ABOVE SPRUCE-FIR AND PINE FORESTS ON
TALUS SLOPES.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY:
03/02/2001

COCONINO

NAME: SENTRY MILK-VETCH

ASTRAGALUS CREMNOPHYLAX VAR CREMNOPHYLA

STATUS: ENDANGERED

CRITICAL HAB No RECOVERY PLAN: No CFR: 55 FR 50184, 12-5-1990

DESCRIPTION: < 1 INCH HIGH FORMING A MAT 1-10 INCHES IN DIAMETER. FLOWERS:
PALE PURPLE APRIL TO MAY

ELEVATION
RANGE: >4000 FT.

COUNTIES: COCONINO

HABITAT: PINYON-JUNIPER-CLIFFROSE ON A WHITE LAYER OF LIMESTONE

GROWS ON KAIBAB LIMESTONE WITH LITTLE SOIL IN AN UNSHADED OPENING IN PINYON-JUNIPER. POSSIBLY
MORE POPULATIONS TO BE FOUND ON SOUTH RIM OF GRAND CANYON AND EAST RIM OF MARBLE GORGE.

NAME: SILER PINCUSHION CACTUS

PEDIOCACTUS SILERI

STATUS: THREATENED

CRITICAL HAB No RECOVERY PLAN: Yes CFR: 44 FR 61786, 11-26-1979

DESCRIPTION: SMALL SOLITARY OR CLUSTERED CACTUS GLOBOSE SHAPED ABOUT 5
INCHES TALL AND 3-4 INCHES IN DIAMETER. FLOWERS: YELLOW WITH
MAROON VEINS

ELEVATION
RANGE: 2800-5400 FT.

COUNTIES: MOHAVE COCONINO

HABITAT: DESERTSCRUB TRANSITIONAL AREAS OF NAVAJO, SAGEBRUSH AND MOHAVE DESERTS

GROWS ON GYPSIFEROUS CLAY AND SANDY SOILS OF MOENKOPI FORMATION.

NAME: WELSHS MILKWEED

ASCLEPIAS WELSHII

STATUS: THREATENED

CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 52 FR 41435, 10-28-1987

DESCRIPTION: MILKWEED FAMILY (ASCLEPIADACEAE), RHIZOMATOUS, HERBACEOUS
PERENNIAL, 10-40 INCHES TALL WITH LARGE OVAL LEAVES. FLOWERS:
CREAM COLORED, ROSE TINGED IN CENTER.

ELEVATION
RANGE: VARIES FT.

COUNTIES: COCONINO

HABITAT: OPEN STABILIZED DESERTSCRUB DUNES AND LEE SIDE OF ACTIVE DUNES

DESIGNATED CRITICAL HABITAT IS IN UTAH.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY:

COCONINO

03/02/2001

NAME: KANAB AMBERSNAIL

OXYLOMA HAYDENI KANABENSIS

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 57 FR 13657, 04-17-1992

DESCRIPTION: SMALL 14-19 MM (<0.7 INCH), LIGHT AMBER COLOR, SOMETIMES GRAYISH-AMBER MOTTLED; RIGHT HANDED SHELL

ELEVATION
RANGE: 2,900 FT.

COUNTIES: COCONINO

HABITAT: TRAVERTINE SEEPS AND SPRINGS IN GRAND CANYON NATIONAL PARK

EXTREMELY GEOGRAPHICALLY ISOLATED. THREE HISTORIC POPULATIONS; TWO REMAINING; ONE ON PRIVATE PROPERTY IN UTAH AND ONE IN GRAND CANYON NATIONAL PARK; SPECIES AFFECTED BY OPERATIONS BY GLEN CANYON DAM. ASSOCIATED WITH WATERCRESS, MONKEY FLOWER, AND OTHER WETLAND VEGETATION.

NAME: BLACK-FOOTED FERRET

MUSTELA NIGRIPES

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67

DESCRIPTION: WEASEL-LIKE, YELLOW BUFF COLORATION WITH BLACK FEET, TAIL TIP, AND EYE MASK. IT HAS A BLUNT LIGHT COLORED NOSE AND IS 15-18 INCHES LONG AND TAIL LENGTH IS 5-6 INCHES.

ELEVATION
RANGE: <10,500 FT.

COUNTIES: COCONINO, APACHE, NAVAJO

HABITAT: GRASSLAND PLAINS GENERALLY FOUND IN ASSOCIATION WITH PRAIRIE DOGS

UNSURVEYED PRAIRIE DOG TOWNS MAY BE OCCUPIED BY FERRETS OR MAY BE APPROPRIATE FOR FUTURE REINTRODUCTION EFFORTS. THE SERVICE DEVELOPED GUIDELINES FOR SURVEYING PRAIRIE DOG TOWNS WHICH ARE AVAILABLE UPON REQUEST. NO POPULATIONS OF THIS SPECIES CURRENTLY KNOWN TO EXIST IN ARIZONA.

NAME: HUMPBAC CHUB

GILA CYPHA

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967, 59 FR 13374, 03-21-1994

DESCRIPTION: LARGE (18 INCH) MINNOW FLATTENED HEAD LONG FLESHY SNOUT, LARGE FINS, AND A VERY LARGE HUMP BETWEEN THE HEAD AND THE DORSAL FIN

ELEVATION
RANGE: <4000 FT.

COUNTIES: COCONINO, MOHAVE

HABITAT: LARGE WARM TURBID RIVERS ESPECIALLY CANYON AREAS WITH DEEP FAST WATER

CRITICAL HABITAT IN GRAND CANYON

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY:

COCONINO

03/02/2001

NAME: LITTLE COLORADO SPINEDACE

LEPIDOMEDA VITTATA

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 52 FR 35054

DESCRIPTION: SMALL (<4 INCHES LONG) SILVERY MINNOW WHICH IS DARKER ON THE BACK THAN THE BELLY

ELEVATION
RANGE: 4000-8000 FT.

COUNTIES: COCONINO, APACHE, NAVAJO

HABITAT: MODERATE TO SMALL STREAMS IN POOLS AND RIFFLES WITH WATER FLOWING OVER GRAVEL AND SILT

CRITICAL HABITAT INCLUDES EIGHTEEN MILES OF EAST CLEAR CREEK, EIGHT MILES OF CHEVELON CREEK, AND FIVE MILES OF NUTRIOS CREEK

NAME: RAZORBACK SUCKER

XYRAUCHEN TEXANUS

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 55 FR 21154, 05-22-1990, 59 FR 13374, 03-21-1994

DESCRIPTION: LARGE (UP TO 3 FEET AND UP TO 16 POUNDS) LONG, HIGH SHARP-EDGED KEEL-LIKE HUMP BEHIND THE HEAD. HEAD FLATTENED ON TOP. OLIVE-BROWN ABOVE TO YELLOWISH BELOW.

ELEVATION
RANGE: <6000 FT.

COUNTIES: GREENLEE, MOHAVE, PINAL, YAVAPAI, YUMA, LA PAZ, MARICOPA (REFUGIA), GILA, COCONINO, GRAHAM

HABITAT: RIVERINE & LACUSTRINE AREAS, GENERALLY NOT IN FAST MOVING WATER AND MAY USE BACKWATERS

SPECIES IS ALSO FOUND IN HORSESHOE RESERVOIR (MARICOPA COUNTY). CRITICAL HABITAT INCLUDES THE 100-YEAR FLOODPLAIN OF THE RIVER THROUGH GRAND CANYON FROM CONFLUENCE WITH PARIA RIVER TO HOOVER DAM; HOOVER DAM TO DAVIS DAM; PARKER DAM TO IMPERIAL DAM. ALSO GILA RIVER FROM AZ/NM BORDER TO COOLIDGE DAM; AND SALT RIVER FROM HWY 60/SR 77 BRIDGE TO ROOSEVELT DAM; VERDE RIVER FROM FS BOUNDARY TO HORSESHOE LAKE.

NAME: BALD EAGLE

HALIAEETUS LEUCOCEPHALUS

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 60 FR 35999, 07-12-95

DESCRIPTION: LARGE, ADULTS HAVE WHITE HEAD AND TAIL, HEIGHT 28 - 38"; WINGSPAN 66 - 96". 1-4 YRS DARK WITH VARYING DEGREES OF MOTTLED BROWN PLUMAGE. FEET BARE OF FEATHERS.

ELEVATION
RANGE: VARIES FT.

COUNTIES: YUMA, LA PAZ, MOHAVE, YAVAPAI, MARICOPA, PINAL, COCONINO, NAVAJO, APACHE, SANTA CRUZ, PIMA, GILA, GRAHAM, COCHISE

HABITAT: LARGE TREES OR CLIFFS NEAR WATER (RESERVOIRS, RIVERS AND STREAMS) WITH ABUNDANT PREY

SOME BIRDS ARE NESTING RESIDENTS WHILE A LARGER NUMBER WINTERS ALONG RIVERS AND RESERVOIRS. AN ESTIMATED 200 TO 300 BIRDS WINTER IN ARIZONA. ONCE ENDANGERED (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) BECAUSE OF REPRODUCTIVE FAILURES FROM PESTICIDE POISONING AND LOSS OF HABITAT, THIS SPECIES WAS DOWN LISTED TO THREATENED ON AUGUST 11, 1995. ILLEGAL SHOOTING, DISTURBANCE, LOSS OF HABITAT CONTINUES TO BE A PROBLEM. SPECIES HAS BEEN PROPOSED FOR DELISTING (64 FR 36454) BUT STILL RECEIVES FULL PROTECTION UNDER ESA.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY:

COCONINO

03/02/2001

NAME: CALIFORNIA CONDOR

GYMNOPS CALIFORNIANUS

STATUS: EXPERIMENTAL/NONESENTIAL CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001; 03-11-67

DESCRIPTION: VERY LARGE VULTURE (47 IN., WINGSPAN TO 9 1/2 FT, WEIGHT TO 22 LBS); ADULT PLUMAGE BLACKISH, IMMATURE MORE BROWNISH; ADULT WING LININGS WHITE, IMMATURE MOTTLED; HEAD & UPPER PARTS OF NECK BARE; YELLOW-ORANGE IN ADULTS, GRAYISH IN IMMATURE. ELEVATION RANGE: VARIES FT.

COUNTIES: MOHAVE, COCONINO, NAVAJO, APACHE

HABITAT: HIGH DESERT CANYONLANDS AND PLATEAUS

LAST WILD CONDOR REPORTED IN ARIZONA IN 1924. RECOVERY PROGRAM HAS REINTRODUCED CONDORS TO NORTHERN ARIZONA, WITH THE FIRST RELEASE (6 BIRDS) IN DECEMBER 1996. RELEASE SITE LOCATED AT THE VERMILLION CLIFFS (COCONINO CO.), WITH AN EXPERIMENTAL/NONESENTIAL AREA DESIGNATED FOR MOST OF NORTHERN ARIZONA AND SOUTHERN UTAH.

NAME: MEXICAN SPOTTED OWL

STRIX OCCIDENTALIS LUCIDA

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 56 FR 14678, 04-11-91; 66

DESCRIPTION: MEDIUM SIZED WITH DARK EYES AND NO EAR TUFTS. BROWNISH AND HEAVILY SPOTTED WITH WHITE OR BEIGE. FR 8530, 2/1/01

ELEVATION
RANGE: 4100-9000 FT.

COUNTIES: MOHAVE, COCONINO, NAVAJO, APACHE, YAVAPAI, GRAHAM, GREENLEE, COCHISE, SANTA CRUZ, PIMA, PINAL, GILA, MARICOPA

HABITAT: NESTS IN CANYONS AND DENSE FORESTS WITH MULTI-LAYERED FOLIAGE STRUCTURE

GENERALLY NESTS IN OLDER FORESTS OF MIXED CONIFER OR PONDERSA PINE/GAMBEL OAK TYPE, IN CANYONS, AND USE VARIETY OF HABITATS FOR FORAGING. SITES WITH COOL MICROCLIMATES APPEAR TO BE OF IMPORTANCE OR ARE PREFERRED. CRITICAL HABITAT WAS REMOVED IN 1998 BUT RE-PROPOSED IN JULY 2000 AND FINALIZED IN FEB 2001 FOR APACHE, COCHISE, COCONINO, GRAHAM, MOHAVE, PIMA COUNTIES; ALSO IN NEW MEXICO, UTAH, AND COLORADO.

NAME: SOUTHWESTERN WILLOW FLYCATCHER

EMPIDONAX TRILLII EXTIMUS

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 62 FR 10694, 02-27-95

DESCRIPTION: SMALL PASSERINE (ABOUT 6") GRAYISH-GREEN BACK AND WINGS, WHITISH THROAT, LIGHT OLIVE-GRAY BREAST AND PALE YELLOWISH BELLY. TWO WINGBARS VISIBLE. EYE-RING FAINT OR ABSENT. ELEVATION RANGE: <8500 FT.

COUNTIES: YAVAPAI, GILA, MARICOPA, MOHAVE, COCONINO, NAVAJO, APACHE, PINAL, LA PAZ, GREENLEE, GRAHAM, YUMA, PIMA, COCHISE, SANTA CRUZ

HABITAT: COTTONWOOD/WILLOW & TAMARISK VEGETATION COMMUNITIES ALONG RIVERS & STREAMS

MIGRATORY RIPARIAN OBLIGATE SPECIES THAT OCCUPIES BREEDING HABITAT FROM LATE APRIL TO SEPTEMBER. DISTRIBUTION WITHIN ITS RANGE IS RESTRICTED TO RIPARIAN CORRIDORS. DIFFICULT TO DISTINGUISH FROM OTHER MEMBERS OF THE EMPIDONAX COMPLEX BY SIGHT ALONE. TRAINING SEMINAR REQUIRED FOR THOSE CONDUCTING FLYCATCHER SURVEYS. CRITICAL HABITAT ON PORTIONS OF THE 100-YEAR FLOODPLAIN ON SAN PEDRO AND VERDE RIVERS; WET BEAVER AND WEST CLEAR CREEKS, INCLUDING TAVASCI MARSH AND ISTER FLAT; THE COLORADO RIVER, THE LITTLE COLORADO RIVER, AND THE WEST, EAST, AND SOUTH FORKS OF THE LITTLE COLORADO RIVER, REFERENCE 60 CFR:62 FR 39129, 7/22/97.

2) PROPOSED

TOTAL= 1

NAME: CHIRICAHUA LEOPARD FROG

RANA CHIRICAHUENSIS

STATUS: PROPOSED CRITICAL HAB No RECOVERY PLAN: No CFR: 65 FR 37343, 6-14-2000

DESCRIPTION: CREAM COLORED TUBERCULES (spots) ON A DARK BACKGROUND ON
THE REAR OF THE THIGH, DORSOLATERAL FOLDS THAT ARE
INTERRUPTED AND DEFLECTED MEDIALY, AND A CALL GIVEN OUT OF
WATER DISTINGUISH THIS SPOTTED FROG FROM OTHER LEOPRD ELEVATION
RANGE: 3300-8900 FT.

COUNTIES: SANTA CRUZ, APACHE, GILA, PIMA, COCHISE, GREENLEE, GRAHAM, YAVAPAI, COCONINO, NAVAJO

HABITAT: STREAMS, RIVERS, BACKWATERS, PONDS, AND STOCK TANKS THAT ARE FREE FROM INTRODUCED FISH
AND BULLFROGS

REQUIRE PERMANENT OR NEARLY PERMANENT WATER SOURCES. POPULATIONS NORTH OF THE GILA RIVER MAY
BE CLOSELY-RELATED, BUT DISTINCT, UNDESCRIBED SPECIES.

03/02/2001

3) CANDIDATE

TOTAL= 1

NAME: FICKEISEN PINCUSHION CACTUS

PEDIOCACTUS PEEBLESIANUS FICKEISENIAE

STATUS: CANDIDATE

CRITICAL HAB No RECOVERY PLAN: No CFR:

DESCRIPTION: VERY SMALL (3 INCHES TALL- 1.5 INCHES DIAMETER) UNBRANCHED
CACTUS THAT RETREATS INTO GRAVELY SOILS AFTER FLOWERING
AND FRUITING. TUBERCLES FORM A SPIRAL PATTERN AROUND PLANT.
CENTRAL SPINE 3/8 INCH LONG FLOWERS CREAM/YELLOW

ELEVATION

RANGE: 4000-5000 FT.

COUNTIES: COCONINO, MOHAVE

HABITAT: EXPOSED LAYERS OF KAIBAB LIMESTONE ON CANYON MARGINS OR HILLS OF NAVAJOAN DESERT

03/02/2001

CONSERVATION AGREEMENT

TOTAL= 2

NAME: ARIZONA BUGBANE

CIMICIFUGA ARIZONICA

STATUS: CONSERVATION AGREEMENT CRITICAL HAB No RECOVERY PLAN: No CFR:

DESCRIPTION: PERENNIAL HERB IN THE BUTTERCUP FAMILY UP TO 6-7 FEET TALL.
SMALL WHITE PETAL-LESS FLOWERS APPEAR IN JULY-AUGUST. FRUIT
A FOLLICLE THAT SPLITS OPEN ON ONE SIDE AS IT DRIES.

ELEVATION
RANGE: 5300-7000 FT.

COUNTIES: COCONINO, GILA

HABITAT: MOIST, LOAMY SOIL BETWEEN CONIFEROUS AND RIPARIAN ECOTONES.

RICH, FERTILE SOILS HIGH IN HUMUS CONTENT, DEEP SHADE, AND HIGH HUMIDITY APPEARS TO BE PRIMARY
HABITAT REQUIREMENTS FOR THIS SPECIES. CONSERVATION AGREEMENT SIGNED IN JUNE 1999.

NAME: KAIBAB PLAINS CACTUS

PEDIOCACTUS PARADINEI

STATUS: CONSERVATION AGREEMENT CRITICAL HAB No RECOVERY PLAN: No CFR:

DESCRIPTION: SMALL, GREEN, GLOBOSE CACTUS; USUALLY LESS THAN 40 MM TALL
WITH HALD OF ITS STEM UNDERGROUND. PLANT DIAMETERS CAN
REACH 60-80 MM. 4-6 SPINES PER AEREOLE; FLOWERS ARE 19-25 MM
WITH CREAM TO PALE YELLOW PETALS AND PINK MIDRIB.

ELEVATION
RANGE: >4,500 FT FT.

COUNTIES: COCONINO

HABITAT: PINYON-JUNIPER WOODLAND, AND SHRUB/GRASSLAND

SPECIES ALSO CALLED PARADINE PLAINS CACTUS. CONSERVATION AGREEMENT BETWEEN THE SERVICE, KAIBAB
NATIONAL FOREST, AND BUREAU OF LAND MANAGEMENT FINALIZED IN OCTOBER 1996; SIGNED IN FEBURARY 1998

APPENDIX B
Cultural Resources Specialists Review

I have reviewed this preferred alternative for conformity with requirement for the § 106 process, with the 1995 Servicewide Programmatic Agreement (if applicable), and applicable parts of the Secretary of the Interior's Stands and Guidelines for Archeology and Historic Preservation, MPS Management Policies, and DO-28. I have stated any additional stipulation that should apply, and I concur in the recommended assessment of effect above.

Signed: James R. Boe 4/10/02 10/22/01
Chief, Cultural Resources Date

Comments: Final flagging / locations must be done w/ archaeologist on-site

Approved: [Signature] 4/13/02 SPW 10-22-01
Park Compliance Coordinator Date

Approved: [Signature] KC for Joel 4/8/02 11-2-01
Superintendent Date

Approved: [Signature] 4/11/02 10/26/01
Director, GRAND CANYON SCIENCE CENTER